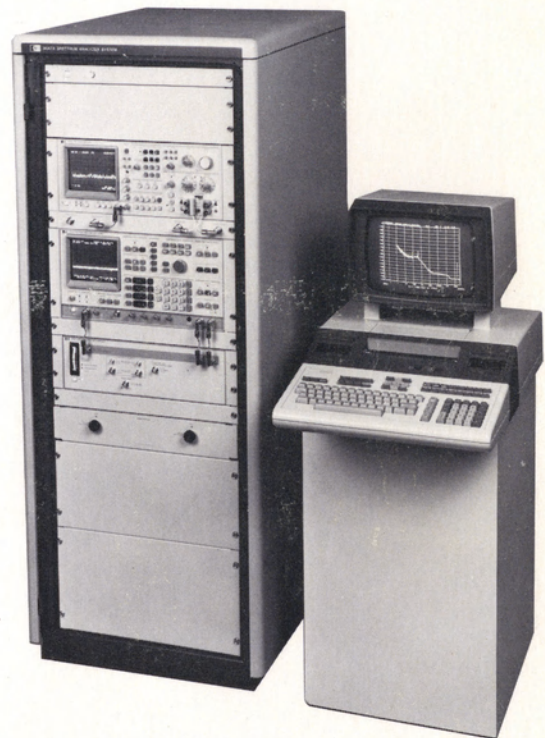


SPECTRUM ANALYZER SYSTEM 3047A



H-MR019

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TM232134

INSTALLATION CHECKLIST

These items are the customer's responsibility and should be performed before an -hp- Customer Engineer arrives on-site for final installation and verification:

- ☐ Safety Considerations reviewed
- ☐ Environmental requirements met at installation site
- ☐ System cabinet unpackaged and placed at installation site
- ☐ Main power source connected to system cabinet by licenced electrician

These items are to be performed on-site by an -hp- Customer Engineer after the above items have been completed:

- ☐ -hp- 3585A installed into the -hp- 3047A
- ☐ -hp- 3582A installed into the -hp- 3047A
- ☐ Correct addresses selected for all instruments
- ☐ Correct line voltage and fuse selected for each instrument
- ☐ System cabling connected
- ☐ Correct select code set for the -hp- 98034B and -hp- 98035A (7 & 6)
- ☐ Operation Verification procedure successfully performed (See Section III of the -hp- 3047A Installation Manual for procedures.)

-HP- 3047A OPERATION VERIFICATION

TEST RECORD

FUNCTIONAL TEST

☐ PASSED

☐ FAILED

If failed, results of DIAGNOSTIC TEST:

PHASE NOISE MODE NOISE FLOOR/SPUR TEST

☐ PASSED

☐ FAILED

Attach results. If failed, describe what failed and at what frequencies.



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INSTALLATION MANUAL

MODEL 3047A

SPECTRUM ANALYZER SYSTEM

WARNING

To prevent potential fire or shock hazard, do not expose equipment to rain or moisture.

Manual Part No. 03047-90001

Microfiche Part No. 03047-90051

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TABLE OF CONTENTS

Section	Page	Section	Page
I. INTRODUCTION	1-1/1-2	III. OPERATION VERIFICATION AFTER INSTALLATION	3-1
1-1. What Is Contained In This Manual	1-1/1-2	3-1. Introduction	3-1
1-2. How Do I Use This Manual?	1-1/1-2	3-2. Recommended Equipment	3-2
II. UNPACKING AND INSTALLATION	2-1	3-3. Operation Verification Procedure	3-2
2-1. Introduction	2-1	3-4. Functional Test	3-2
2-2. Safety Considerations	2-1	3-5. Noise Floor/Spur Test	3-3
2-3. Required Tools	2-2	3-6. What If A Test Fails?	3-5
2-4. Environmental Requirements	2-2	3-7. Controlling The -hp- 35601 Using Subprogram "SWITCH"	3-6
2-5. Operating Environment	2-2	3-8. Introduction	3-6
2-6. Storage/Shipping Environment	2-2	3-9. Initializing "SWITCH"	3-6
2-7. Unpacking The -hp- 3047A Cabinet	2-3	3-10. Special Function Keys	3-7
2-8. Power Requirements	2-8	3-11. Entering a Command String	3-8
2-9. Main Power Source Requirements	2-8	IV. REPLACEABLE PARTS	4-1
2-10. Main Power Source Connection	2-8	4-1. Introduction	4-1
2-11. Voltage and Fuse Selections	2-9	4-2. Ordering Information	4-1
2-12. Installing The -hp- 3585A and 3582A	2-10	4-3. Parts Not Listed	4-2
2-13. Install The -hp- 3585A	2-11	4-4. Direct Mail Order System	4-2
2-14. Install The -hp- 3582A	2-11		
2-15. HP-IB Address Selections	2-12		
2-16. Connecting The Instruments	2-12		
2-17. Installing The -hp- 35601A after Servicing	2-14		

LIST OF TABLES

Table	Page	Table	Page
3-1. Recommended Test Equipment For Operation Verification	3-2	4-6. Replaceable Parts For Writing Surface	4-9/4-10
3-2. "SWITCH" Commands	3-8	4-7. Replaceable Parts For Instrument Installation Hardware	4-11/4-12
4-1. Standard Abbreviations	4-1	4-8. Replaceable Parts For Power Strip	4-13/4-14
4-2. Manufacturers Code List	4-2	4-9. Replaceable Parts For Power Supply	4-15/4-16
4-3. Replaceable Parts for the -hp- 29431B Cabinet	4-3/4-4	4-10. Replaceable Parts For Power Control Unit	4-17/4-18
4-4. Replaceable Parts For Rack-Mount Items	4-5/4-6	4-11. Replaceable Parts For The System Cabling	4-23/4-24
4-5. Replaceable Parts For Power Panel	4-7/4-8		

LIST OF ILLUSTRATIONS

Figure	Page	Figure	Page
2-1. Removing The Cardboard Top.....	2-3	3-4. -hp- 35601A Block Diagram with Switches Shown in Turn-on State.....	3-9/3-10
2-2. Remove The Ramp From The Top Of The Cabinet.....	2-4	4-1. Exploded View of 29431 Cabinet.....	4-3/4-4
2-3. Removing The Securing Belts.....	2-5	4-2. Rack-Mounted Items In -hp- 3047A.....	4-5/4-6
2-4. Adjusting The Levelers.....	2-6	4-3. Power Panel Detail.....	4-7/4-8
2-5. Removing The Cabinet From The Crate.....	2-7	4-4. Writing Surface Detail.....	4-9/4-10
2-6. Main Power Source Connection.....	2-9	4-5. Instrument Installation Hardware.....	4-11/4-12
2-7. Instrument Installation Hardware.....	2-10	4-6. Power Strip Detail.....	4-13/4-14
2-8. System Cabling.....	2-13	4-7. Exploded View Of Power Supply.....	4-15/4-16
3-1. Operation Verification Flowchart.....	3-1	4-8. Exploded View Of Power Control Unit.....	4-17/4-18
3-2. Noise Floor Equipment Set-up.....	3-4	4-9. 120 Volt Wiring Diagram/Schematic...	4-19/4-20
3-3. Phase Noise Analysis Noise Floor and Spur.....	3-5	4-10. 230 Volt Wiring Diagram/Schematic...	4-21/4-22
		4-11. System Cabling.....	4-23/4-24



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SAFETY SUMMARY

The following general safety precautions must be observed during all phases of operation, service, and repair of this system. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the system. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements. This is a Safety Class 1 system.

GROUND THE INSTRUMENT

To minimize shock hazard, the system chassis and/or cabinet must be connected to an electrical ground. The power cable must either be plugged into an approved three-contact electrical outlet or if permanently wired, the grounding wire (green) must be connected to a reliable electrical (safety) ground.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate this system in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made by qualified service trained maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT SERVICE OR ADJUST ALONE

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT SUBSTITUTE PARTS OR MODIFY INSTRUMENT

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the instrument. Return the instrument to a Hewlett-Packard Sales and Service Office for service and repair to ensure that safety features are maintained.

DANGEROUS PROCEDURE WARNINGS

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING

Dangerous voltages, capable of causing death, are present in this instrument. Use extreme caution when handling, testing, and adjusting.

SAFETY SYMBOLS

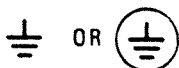
General Definitions of Safety Symbols Used On Equipment or In Manuals.



Instruction manual symbol: the product will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage to the instrument.



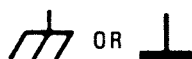
Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 volts must be so marked).



Protective conductor terminal. For protection against electrical shock in case of a fault. Used with field wiring terminals to indicate the terminal which must be connected to ground before operating equipment.



Low-noise or noiseless, clean ground (earth) terminal. Used for a signal common, as well as providing protection against electrical shock in case of a fault. A terminal marked with this symbol must be connected to ground in the manner described in the installation (operating) manual, and before operating the equipment.



Frame or chassis terminal. A connection to the frame (chassis) of the equipment which normally includes all exposed metal structures.



Alternating current (power line).



Direct current (power line).



Alternating or direct current (power line).

WARNING

The WARNING sign denotes a hazard. It calls attention to a procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death to personnel.



The CAUTION sign denotes a hazard. It calls attention to an operating procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

NOTE :

The NOTE sign denotes important information. It calls attention to procedure, practice, condition or the like, which is essential to highlight.

SECTION I

INTRODUCTION

1-1. WHAT IS CONTAINED IN THIS MANUAL?

This manual contains the information necessary for the installation of the -hp- 3047A Spectrum Analyzer System. The following items are included:

- Section I: Introduction
- Section II: Unpacking and Installation procedures
- Section III: Operation Verification procedures
- Section IV: Replaceable Parts

1-2. HOW DO I USE THIS MANUAL?

Upon receipt of the -hp- 3047A System, the customer should follow the instructions in Section II of this manual up to and including the discussion entitled **POWER REQUIREMENTS**. After this, the remainder of the installation process should be performed by an -hp- Customer Engineer; this will include the rest of Section II and all of Section III. The **INSTALLATION CHECKLIST** at the end of this section may facilitate this process.

If the -hp- 3047A System should ever fail to operate correctly, the Diagnostic Test described in Section III provides a means of determining which instrument in the system is defective. After the faulty instrument has been repaired, the Operation Verification procedure may be used to confirm proper operation of the system. In order to verify that the system meets its specifications, however, a full Performance Test should be run (See -hp- 3047A System Reference Manual).

Section IV has been included to provide the user with information for the ordering of replacement parts. Only parts not associated with an individual instrument of the system have been included in the list.

SECTION II

UNPACKING AND INSTALLATION

2-1. INTRODUCTION

This section contains the information necessary to unpack and install the -hp- 3047A Spectrum Analyzer System. Included in this section are the following topics:

- Safety Considerations
- Required Tools
- Environmental Requirements
- Unpacking the -hp- 3047A Cabinet
- Power Requirements
- Installing the -hp- 3585A and -hp- 3582A
- HP-IB Address Selections
- Connecting the Instruments
- Installing the -hp- 35601A after servicing

Be sure to review the Safety Considerations before attempting installation. To facilitate the installation process, you may elect to use the installation check-list provided at the end of Section I; this card may be torn out of the manual or photocopied.

2-2. SAFETY CONSIDERATIONS

The -hp- 3047A Spectrum Analyzer System is a Safety Class I instrument and has been designed according to international safety standards. To ensure safe installation of the system, cautions and warnings throughout this manual must be adhered to. Before beginning installation, be sure to read the following warning and caution.

WARNING

Because of extreme electrical shock hazard, the main power connection should be performed by a qualified electrician before the instruments are installed into the system cabinet. After this has been accomplished, an -hp- Customer Engineer may continue with the installation/verification procedure. UNDER NO CIRCUMSTANCES SHOULD ANY ONE OTHER THAN A QUALIFIED, LICENCED ELECTRICIAN CONNECT THE MAIN POWER SOURCE TO THE -HP- 3047A SPECTRUM ANALYZER SYSTEM.



Before applying ac-line voltage from the power mains to the -hp- 3047A Spectrum Analyzer System, make sure that either the instruments are NOT connected to a power strip, or that the correct voltages and fuses are selected.

2-3. REQUIRED TOOLS

Once the main power source has been connected to the system, the tools required for the installation of the instruments are as follows:

- Number 2 Pozidrive
- 4 mm Nutdriver
- Small Flatblade Screwdriver

2-4. ENVIRONMENTAL REQUIREMENTS



To prevent potential electrical or fire hazard, do not expose equipment to rain or moisture.

2-5. Operating Environment

In order for the -hp- 3047A to meet its operating specifications, its operating environment must be within the following limits:

- Temperature 0°C to + 55°C (+ 32°F to + 131°F)
- Relative Humidity < 95%
- Altitude < 4600 metres (15000 ft)
- Magnetic Field Strength < 0.05 gauss

2-6. Storage/Shipping Environment

The -hp- 3047A should be stored in a clean, dry environment. The following environmental limitations apply to both storage and shipment.

- Temperature -40°C to + 75°C (-40°F to + 158°F)
- Relative Humidity < 95%
- Altitude < 15300 metres (50000 ft)

2-7. UNPACKING THE -HP- 3047A CABINET

The following instructions are for the removal of the -hp- 3047A System cabinet from its shipping crate:

1. Remove the cardboard top of the shipping crate as shown in Figure 2-1.

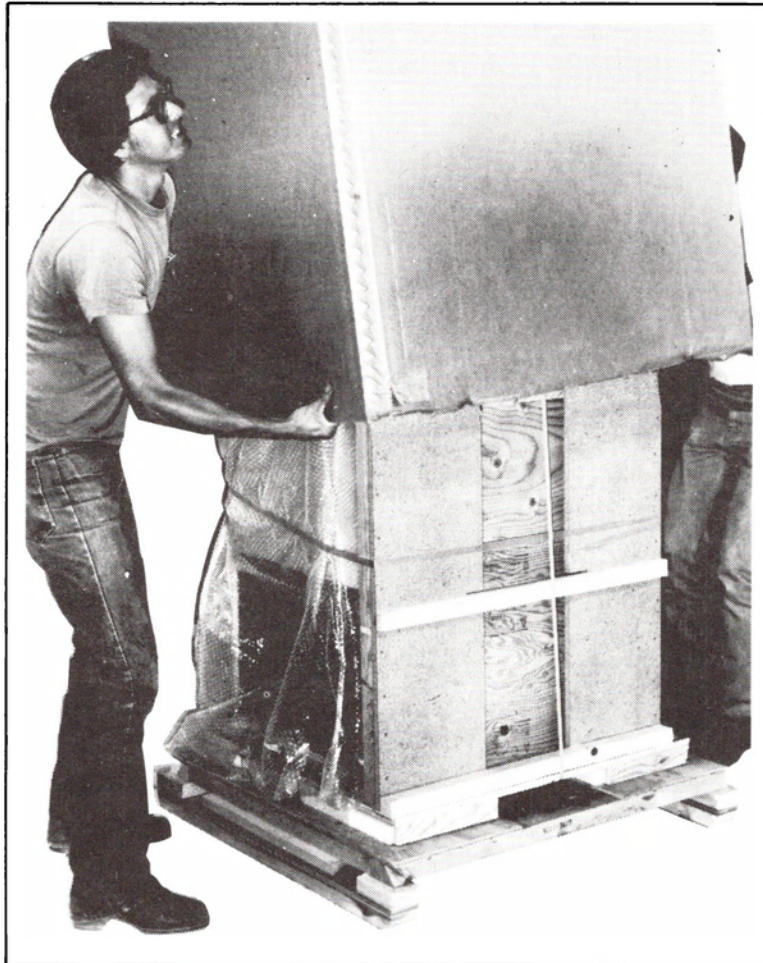


Figure 2-1. Removing The Cardboard Top

2. Remove the ramp that should be located on top of the system cabinet as shown in Figure 2-2.



Figure 2-2. Remove The Ramp From The Top Of The Cabinet

3. Remove the securing bolts from the levelers as shown in Figure 2-3.

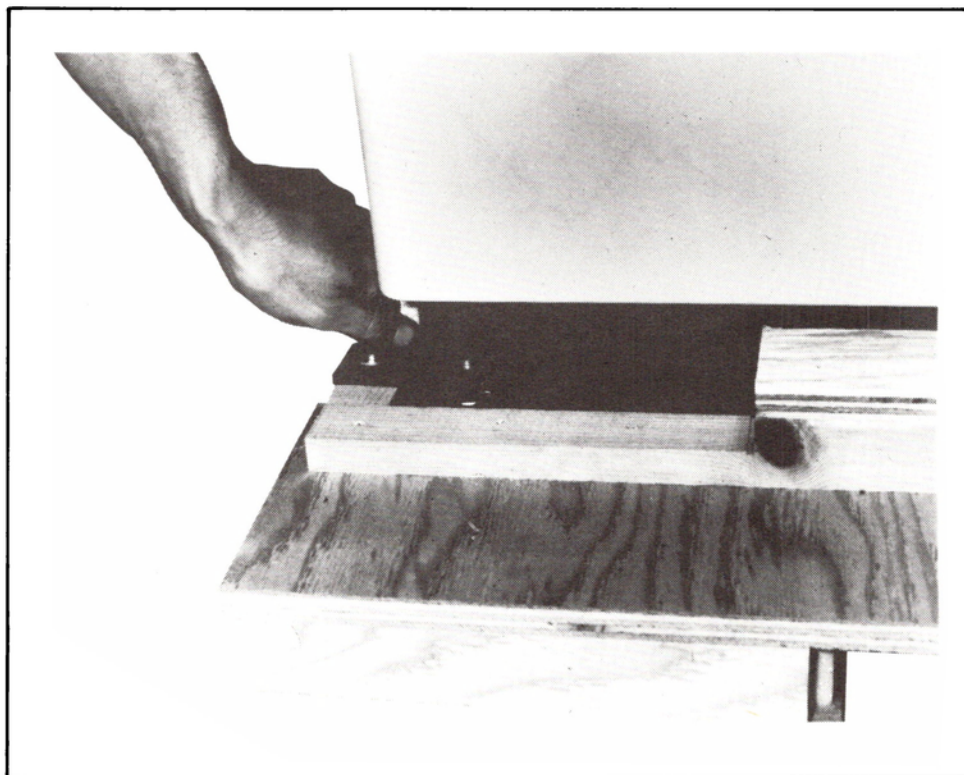


Figure 2-3. Removing The Securing Bolts

4. Adjust the levelers up as shown in Figure 2-4.

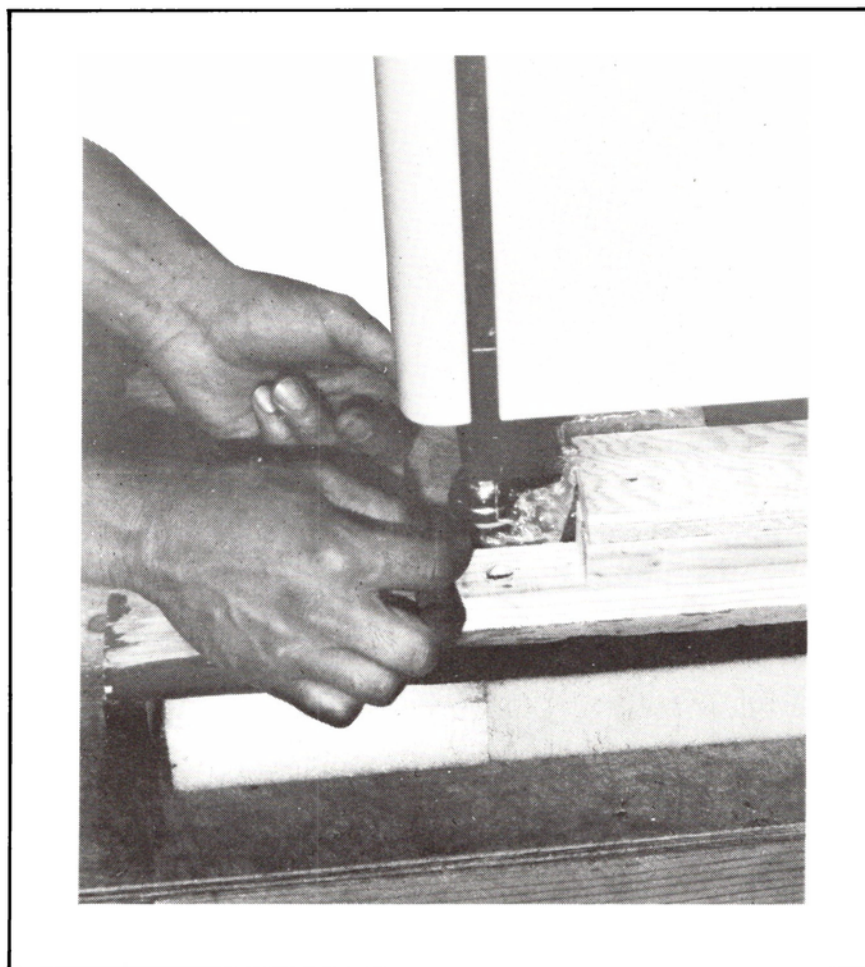


Figure 2-4. Adjusting The Levelers

5. Place the ramp on the edge of the crate, and remove the cabinet from the crate as shown in Figure 2-5.

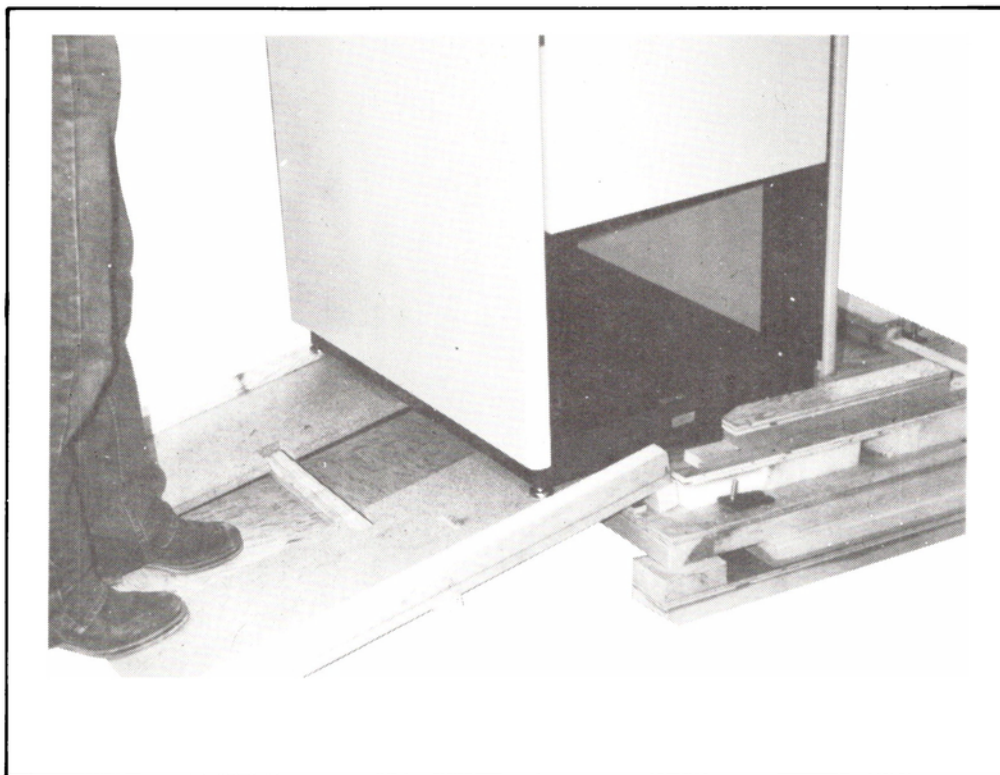


Figure 2-5. Removing The Cabinet From The Crate

2-8. POWER REQUIREMENTS

This discussion contains information concerning the power requirements of the -hp- 3047A Spectrum Analyzer System. This includes the following topics:

- Main Power Source Requirements
- Main Power Source Connection
- Voltage and Fuse Selections for the Instruments

2-9. Main Power Source Requirements

The -hp- 3047A Spectrum Analyzer System requires one of the following single-phase ac power sources:

- 86V to 127V, 20 Amps, 48Hz to 66Hz (120V System)
- 189V to 225V, 10 Amps, 48Hz to 66Hz (230V System)

To protect operating personnel, the system cabinet must be grounded. This is accomplished when the -hp- 3047A is properly connected to a power source.

2-10. Main Power Source Connection

WARNING

The Main Power Connection should be performed by a qualified electrician before the instruments are installed into the system cabinet. After this has been accomplished, an -hp- Customer Engineer may continue with the installation/verification procedure. UNDER NO CIRCUMSTANCES SHOULD ANY ONE OTHER THAN A QUALIFIED, LICENCED ELECTRICIAN CONNECT THE MAIN POWER SOURCE TO THE -HP- 3047A SPECTRUM ANALYZER SYSTEM.

CAUTION

Before applying ac-line voltage from the power mains to the -hp- 3047A Spectrum Analyzer System, make sure that either the instruments are not connected to a power strip, or that the correct voltages and fuses are selected.

To properly connect the -hp- 3047A to a main power source, requires three conductors of suitable color, length, current rating, and voltage rating (see the previous discussion) enclosed in conduit or vinyl. These factors should be determined based on installation needs and local safety regulations. These three conductors should be routed through the receptacle and connected to the terminal block and grounding strip as shown in Figure 2-6. The line wire ("hot") should be connected to terminal 2 (MAINS X) of the terminal block. The neutral wire should be connected to terminal 1 (NEUTRAL) of the terminal block. The ground wire should be connected to the grounding strip.

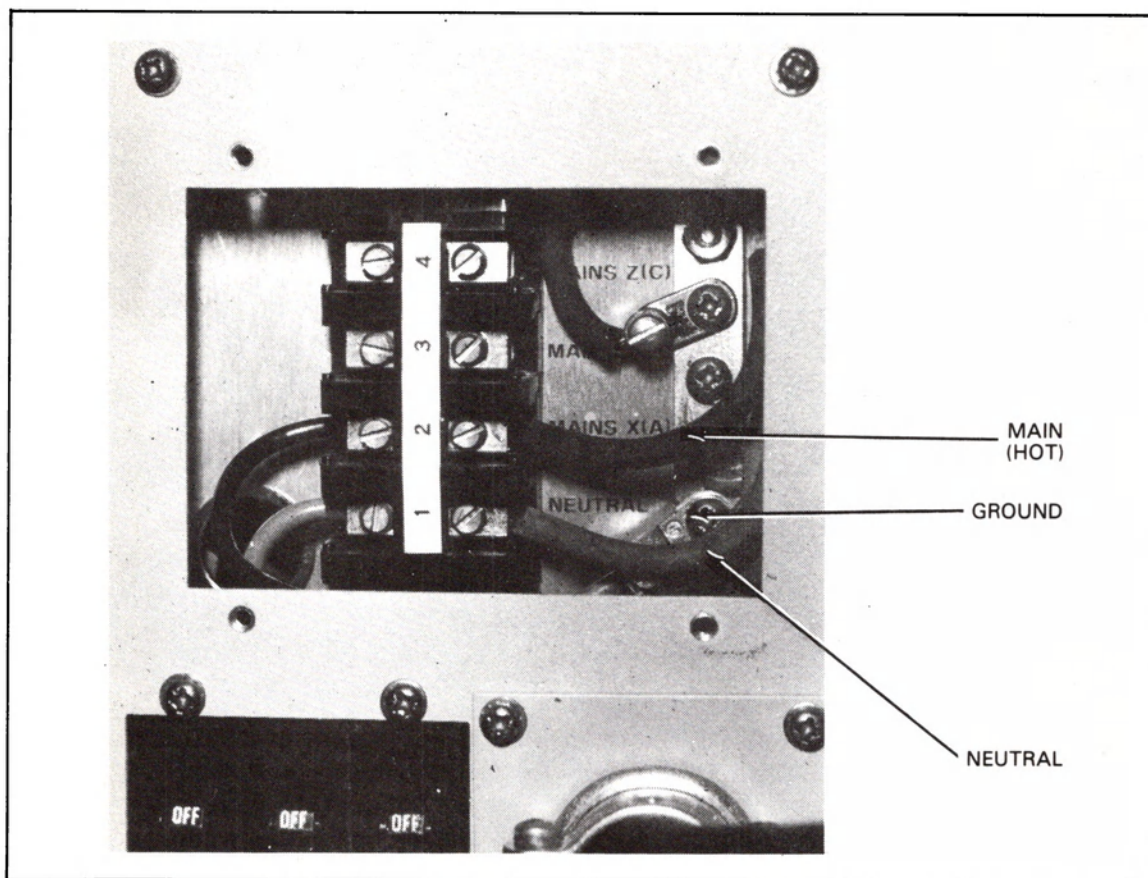


Figure 2-6. Main Power Source Connection

When the previously described connection has been made, it may be checked by turning on the the system switch and confirming that the proper voltage is present at the power strip outlets. Use a multimeter when measuring the voltage at the power strips in the cabinet. Also make sure that the cabinet is at ground potential.

2-11. Voltage and Fuse Selections

When installing a 120V system, check that the following voltages and fuse selections have been made:

Instrument	Voltage Selection	Fuse Selection
-hp- 9845T	90-126V	5A
-hp- 3585A	115V	3A
-hp- 3582A	100 or 120V	2A
-hp- 35601A	100 or 120V	0.5A

When installing a 240V system, check that the following voltages and fuse selections have been made:

Instrument	Voltage Selection	Fuse Selection
-hp- 9845T	198-252V	2.5A
-hp- 3585A	220V	1.5A
-hp- 3582A	220 or 240V	1A
-hp- 35601A	220 or 240V	0.25A

2-12. INSTALLING THE -HP- 3585A AND -HP- 3582A

The following instructions provide the information necessary to mechanically install the -hp- 3585A and the -hp- 3582A into the -hp- 3047A System cabinet. All of the hardware necessary for installation is either attached to the instrument, or the system cabinet; this hardware is illustrated in Figure 2-7.

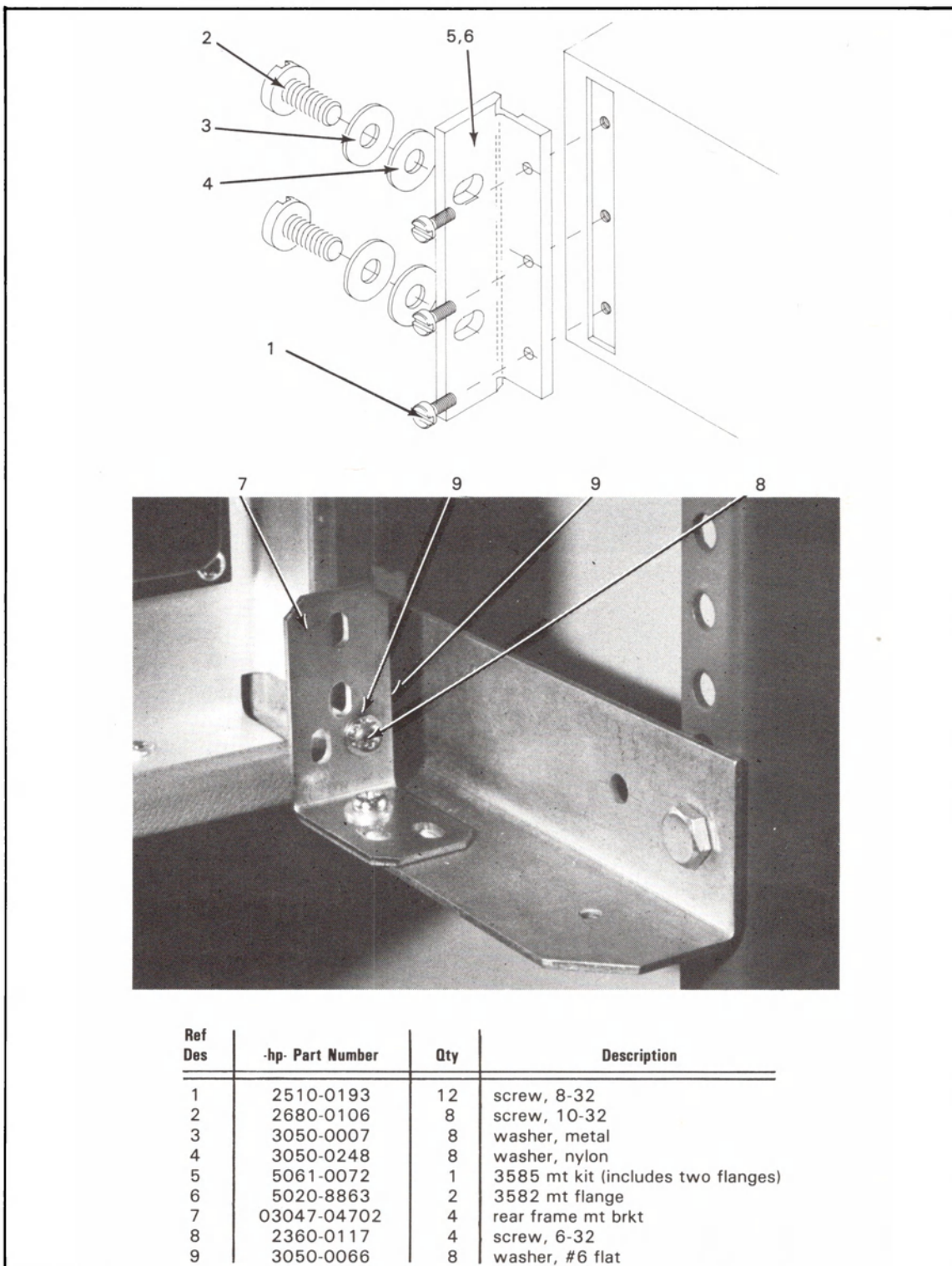


Figure 2-7. Instrument Installation Hardware

2-13. Install the -hp- 3585A

1. Remove the screws from the sides of the front panel casting -hp- 3585A; these will be used to attach the rack-mount flanges to the instrument.
2. Remove the screws from the bottom corners of the rear panel casting of the instrument; these will be used to attach the rear frame mounting brackets.
3. Remove the screws attaching the rack-mount flanges to the system cabinet; these will be reattached when the instrument is installed.
4. Attach the rack-mount flanges to the sides of the -hp- 3585A using the screws removed in step 1. Be sure to put the washers in the appropriate places as shown in Figure 2-7.
5. Slide the -hp- 3585A into the system cabinet.
6. Secure the instrument into the system cabinet with the rack-mount flanges using the screws removed in step 3. Be sure to put the washers in the appropriate places as shown in Figure 2-7.
7. Attach the rear frame mounting brackets to the rear panel of the -hp- 3585A as shown in the photograph in Figure 2-7. Use the screws removed in step 2.

2-14. Install the -hp- 3582A

1. Remove the screws from the sides of the front panel casting -hp- 3582A; these will be used to attach the rack-mount flanges to the instrument.
2. Remove the screws from the bottom corners of the rear panel casting of the instrument; these will be used to attach the rear frame mounting brackets.
3. Remove the screws attaching the rack-mount flanges to the system cabinet; these will be reattached when the instrument is installed.
4. Attach the rack-mount flanges to the sides of the -hp- 3582A using the screws removed in step 1. Be sure to put the washers in the appropriate places as shown in Figure 2-7.
5. Slide the -hp- 3582A into the system cabinet.
6. Secure the instrument into the system cabinet with the rack-mount flanges using the screws removed in step 3. Be sure to put the washers in the appropriate places as shown in Figure 2-7.
7. Attach the rear frame mounting brackets to the rear panel of the -hp- 3582A as shown in the photograph in Figure 2-7. Use the screws removed in step 2.

2-15. HP-IB ADDRESS SELECTIONS

The HP-IB address of each instrument has been set at the factory to be compatible with -hp- 3047A System software. These addresses are as follows:

Instrument	Address	Address Select Switch Positions
-hp- 3582A	11	0 1 0 1 1
-hp- 3585A	13	0 1 1 0 1
-hp- 35601A	15	0 1 1 1 1
Plotter (if added)	6	0 0 1 1 0

To change an address on any of these instruments, refer to the Installation section of that instruments Operating and Service manual (Service manual for the -hp- 3585A).

NOTE

In order for the system to operate, the addresses of all instruments MUST correspond to those set at the factory.

In addition, the select code for the -hp- 98034B HP-IB Interface should be 7, and the select code for the -hp- 98035A Real Time Clock Interface should be 6. The procedure to set these is included in the discussion entitled CONNECTING THE INSTRUMENTS.

2-16. CONNECTING THE INSTRUMENTS

The following instructions provide the information necessary to interconnect the instruments in the -hp- 3047A System. The cables have been routed through the system cabinet at the factory; this routing MUST NOT be changed. If a cable is ever replaced, special care must be taken to ensure that all cables have been placed in the positions shown in Figure 2-8.

NOTE

Failure to ensure proper placement of cables in the system cabinet as shown in Figure 2-8 may result in decreased performance of the -hp- 3047A Spectrum Analyzer System. That is, if cable routing has been changed from that shown in Figure 2-8, system performance specifications are not guaranteed.

1. Connect an HP-IB filter to the HP-IB connector on the back of the -hp- 3585A and the -hp- 3582A.
2. Connect the HP-IB cable from -hp- 35601A to the HP-IB filter on the back of the -hp- 3585A.
3. Connect the HP-IB cable routed through the right side of the system cabinet (looking from the rear) to the HP-IB filter on the back of the -hp- 3582A.
4. Connect the coaxial BNC cable labelled "10MHz/Ref/Output" from the back of the -hp- 35601A to the jack on the back of the -hp- 3585A labelled 10MHz REF OUT.

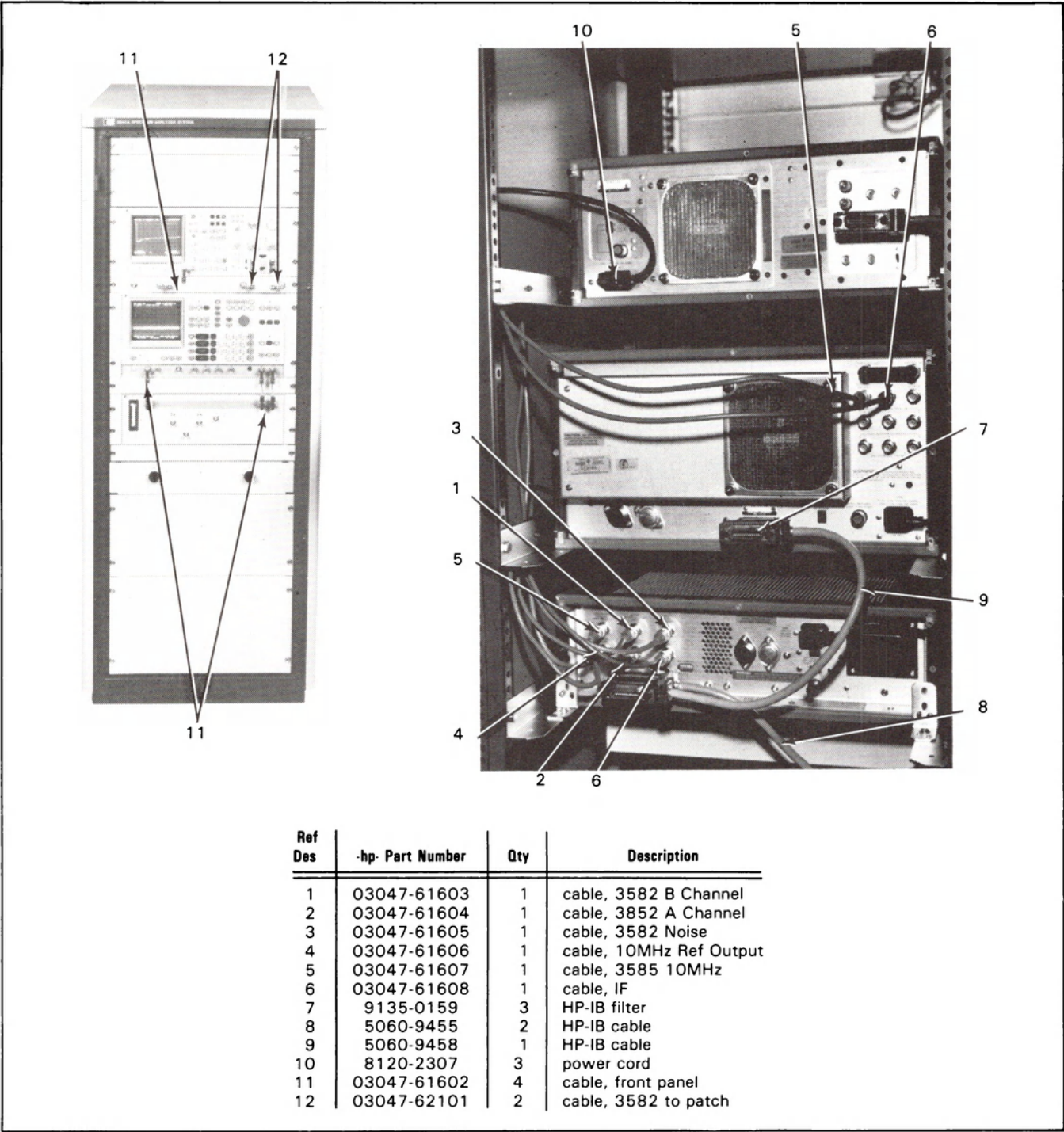


Figure 2-8. System Cabling

5. Connect the coaxial BNC cable labelled "3585A/IF" from the back of the -hp-35601A to the jack on the back of the -hp- 3585A labelled IF OUT.



Before connecting the power cables from the power strip to the instruments, and before applying power to the system with the main power switch, make certain that the power mains for the system has been wired correctly, and that the correct line voltage and fuse has been selected for each instrument. These topics are covered in the discussion entitled POWER REQUIREMENTS.

6. Connect a power cable from the power strip to the -hp- 3585A; connect a power cable from the power strip to the -hp- 3582A.
7. Connect one of the two front-panel BNC to banana cables between the -hp- 3582A A Channel Input and the jack on the patch panel labelled OUTPUT TO 3582A A CHANNEL; connect the other BNC to banana cable between the -hp- 3582A B Channel Input and the jack on the patch panel labelled OUTPUT TO 3582A B CHANNEL.
8. Connect one of the four front-panel BNC to BNC cables between the -hp- 3582A Noise Output and the jack on the patch panel labelled INPUT FROM 3582A NOISE SOURCE.
9. Connect a BNC to BNC cable from the -hp- 3585A Tracking Generator to the jack on the -hp- 35601A labelled INPUT FROM 3585A TRACKING GENERATOR.
10. Connect a BNC to BNC cable from the -hp- 3585A 1M Ω Input to the jack directly below it on the -hp- 35601A labelled OUTPUTS TO 3585A 1M Ω .
11. Connect the last BNC to BNC cable from the -hp- 3585A 50 Ω Input to the jack directly below it on the -hp- 35601A labelled OUTPUTS TO 3585A 50 Ω .
12. Install the -hp- 98035A Real Time Clock Interface into the back of the -hp- 9845T computer. Using a small flat blade screwdriver, turn the selector switch in the top of the clock to position 6; this gives the clock a select code of 6.
13. Install the -hp- 98034B HP-IB Interface into the back of the -hp- 9845T computer. Using a small flat blade screwdriver, turn the selector switch in top of the Interface to position 7; this gives the clock a select code of 7.
14. Connect the other end of the -hp- 98034B HP-IB Interface to the HP-IB connector on the back of the -hp- 3047A System cabinet.

2-17. INSTALLING THE -HP- 35601A AFTER SERVICING

For instructions on the installation of the -hp- 35601A into the -hp- 3047A in the case where the -hp- 35601A has been removed for servicing, refer to the Installation section of the -hp- 35601A Operating and Service manual (-hp- part number 35601-90000).

SECTION III

OPERATION VERIFICATION AFTER INSTALLATION

3-1. INTRODUCTION

This section contains the information necessary to verify the operation of the -hp- 3047A Spectrum Analyzer System. Included in this section is a list of recommended equipment, the operation verification procedure, and instructions to follow in the rare case that the verification should fail. A flowchart for the Operation Verification procedure is shown in Figure 3-1. The operation verification procedure should be followed when installing the system for the first time; after servicing, however, the performance test procedure should be followed to verify the specifications of the system.

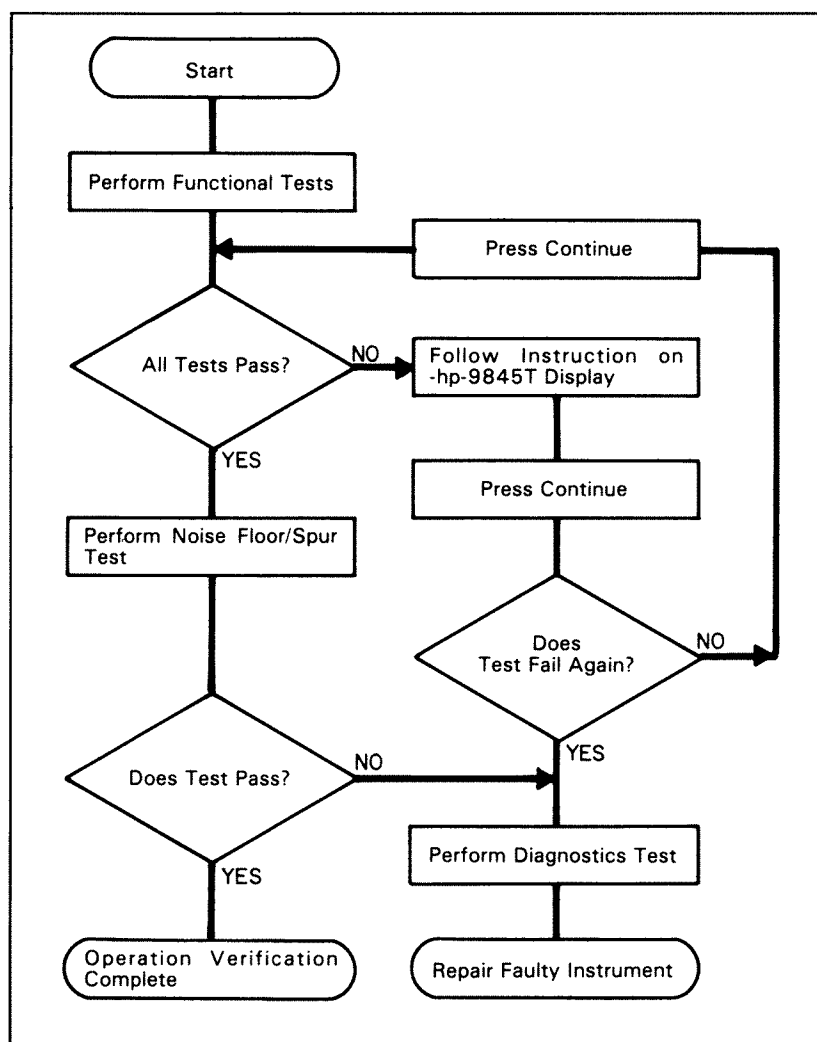


Figure 3-1. Operation Verification Flowchart

3-2. RECOMMENDED EQUIPMENT

Shown in Table 3-1 is a list of recommended equipment for the operation verification procedure.

Table 3-1. Recommended Test Equipment For Operation Verification.

Equipment	Critical Specifications	Recommended -hp- Model
Verification Software	containing "3047CK"	part number 03047-10005
Signal Generator	500MHz capability	-hp- 8640B
Quadrature Test Fixture		part number 03047-84401

3-3. OPERATION VERIFICATION PROCEDURE

The operation verification procedure should be performed after system installation or if the system has just been serviced. Included in the operation verification procedure is a Functional test and a Noise Floor/Spur test for the Phase Noise mode of operation. The functional test is simply part of the system software program "3047CK" (-hp- part number 03047-10005). The test is performed in approximately 10 minutes and requires little user interaction. The noise floor/spur test is identical to the performance test found in the -hp- 3047A System Reference manual.

3-4. Functional Test

During any time while the program is executing, special function keys <shift> K7 or <shift> K11 may be pressed. The latter simply stops the program; the former initializes a subprogram called "SWITCH". "SWITCH" gives the user the ability to control the -hp- 35601A without executing any user functions of the system. Virtually any signal path and operating parameter of the -hp- 35601A may be set using "SWITCH". For instructions on using "SWITCH", refer to the discussion at the end of section III of this manual.

1. Insert the tape containing "3047CK" into the T14 tape drive of the -hp- 9845T computer. Press the autostart key into the down position. Cycle power on the -hp- 9845T; this operation will automatically load and run the program.

NOTE

If the -hp- 9845T fails during its turn-on self-check, contact the desktop computer support group of your local -hp- Sales and Service Office.

2. When the program runs, a menu should be displayed giving the user a choice between two tests, the Functional Test and the Diagnostic Test. On the -hp- 9845T, enter 1 and press CONT.
3. The program then displays some instructions. Note that <shift> K7 and <shift> K11 are only operative when the program is actually executing; the program is executing when a solid square appears in the lower right corner of the computer display. A failed test may be rerun by pressing CONT. Turn on the power to the instruments in the system and press CONT.

4. At this point the user is instructed to disconnect user inputs to the -hp- 35601A (with the exception of the 1-18GHz input). When this is completed, press CONT.

5. The -hp- 35601A LISTEN light should be on; if it is, enter YES and press CONT. If the LISTEN light is not on, check the HP-IB cabling, enter NO, and press CONT. When NO is entered, the display is repeated.

6. The user is now instructed to set the -hp- 3582A Noise Source to periodic and the level to maximum (fully clockwise). When this is completed, press CONT.

7. The functional test for the system is performed at this point without user interaction. The program will stop if a test fails; the failed test may be repeated and the remaining tests performed by pressing CONT. If a test will not pass, refer to the discussion entitled "WHAT IF A TEST FAILS?"

3-5. Noise Floor/Spur Test

This test is identical to the Noise Floor/Spur test (Phase Noise) found in the performance tests of the -hp- 3047A System Reference manual; it checks noise floor and spur specifications of the Phase Noise Analysis measurement routine. The test procedure is as follows:

1. LOAD and RUN the Phase Noise program "PHASE". Follow the program prompts until the MAIN MENU is reached.

2. Select measurement option K1.

3. Set USER'S OSCILLATOR CHARACTERISTICS as follows:

```
PHASE DETECTOR INPUT FREQ .... 385 MHz
CARRIER FREQ ..... 385 MHz
MIXER IS ..... Internal
CALIBRATION OPTION ..... 1
```

4. Set MEASUREMENT PARAMETERS as follows:

```
START FREQ ..... 0.02 Hz
STOP FREQ ..... 40 MHz
NUMBER OF AVERAGES ..... 4
```

5. Set PLOT PARAMETERS as follows:

```
GRAPH TYPE ..... 1
PLOTTER TYPE ..... 9845
Y-AXIS MIN ..... -200
Y-AXIS MAX ..... 0
X-AXIS MIN ..... .01
X-AXIS MAX ..... 40 MHz
TITLE ..... NOISE FLOOR/SPUR SPEC
TEST (PHASE NOISE)
```

6. Set up the equipment as shown in Figure 3-2.

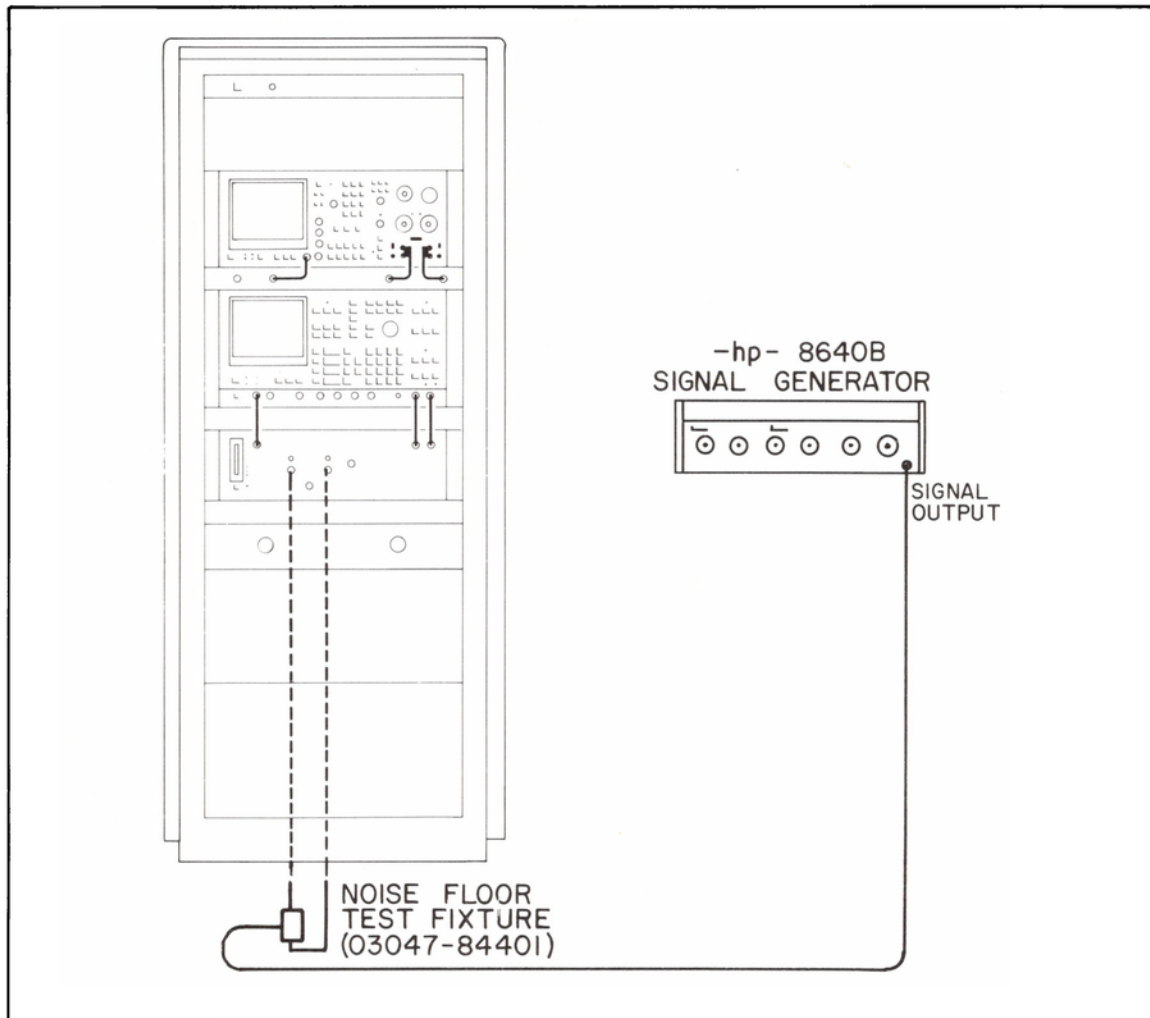


Figure 3-2. Noise Floor Equipment Set-up

7. Set the -hp- 8640B as follows:

FREQUENCY	385 MHz
AMPLITUDE	$\geq +19$ dBm
AM	off
PM	off

8. Continue following program prompts.

9. Enter Phase Slope of 0.6 volts/radian.

10. When instructed by the program prompt, select K14 to display the Noise Floor plot.

11. When the plot is complete, press K13 of the -hp- 9845T to generate a hardcopy of the measurement result. Verify that the Spur and Noise specifications (shown in Figure 3-3) are met. Attach this copy to the Installation Operation Verification Test Card at the end of this section.

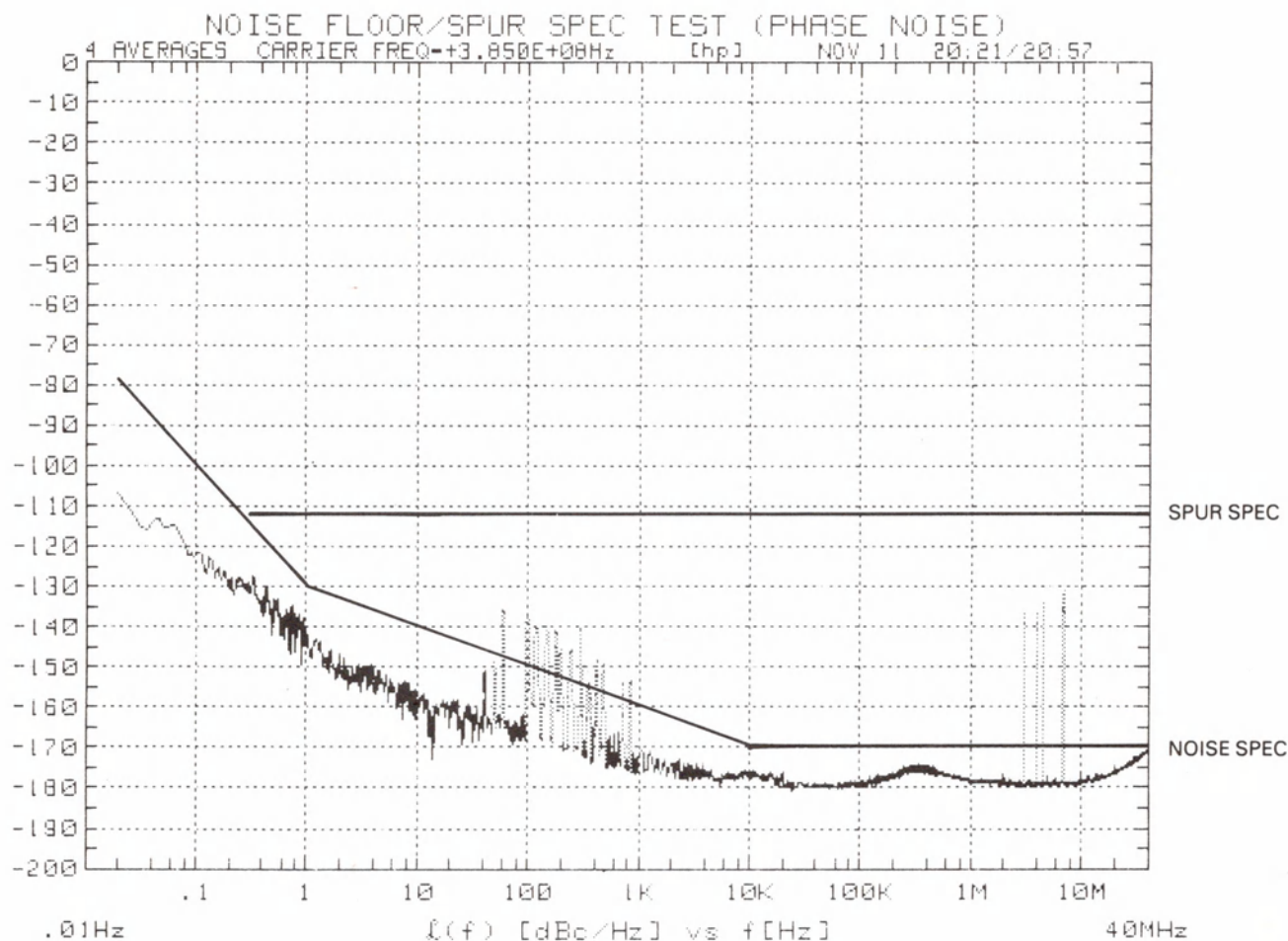


Figure 3-3. Phase Noise Analysis Noise Floor and Spur

3-6. WHAT IF A TEST FAILS?

The likelihood of a Functional test failing on a correctly installed, new -hp- 3047A Spectrum Analyzer System is, of course, very low. If you have trouble, however, the information given on the display of the computer can be very helpful in isolating a problem to an instrument of the system. If a minor problem has been remedied, the failed test may be rerun by pressing CONT; the remainder of the test will also be executed if the test now passes.

If the Functional test won't pass, or the Noise Floor/Spur test fails, initialize the test program "3047CK" again and run the Diagnostics test. This test should repeat some of the tests in the Functional test and perform some additional tests. The Diagnostics test requires more user interaction than the Functional test and should be very facilitative in isolating the failing instrument in the -hp- 3047A.

To run the Diagnostics test, perform the following procedure:

1. Insert the tape containing "3047CK" into the T14 tape drive of the -hp- 9845T computer. Press the autostart key into the down position. Cycle power on the -hp- 9845T; this operation will automatically load and run the program.

2. When the program runs, a menu should be displayed giving the user a choice between two tests, the Functional Test and the Diagnostic Test. On the -hp- 9845T, enter 2 and press CONT.

3. Follow the instructions given by the program prompts.

3-7. CONTROLLING THE -hp- 35601A USING SUBPROGRAM "SWITCH"

3-8. Introduction

"SWITCH" is a subprogram of the test program "3047CK" (-hp- part number 03047-10005.) "SWITCH" enables the user to control all of the switches, relays, and programmable parameters of the -hp- 35601A via an -hp- 9845T. This subprogram is useful for troubleshooting since the -hp- 35601A has virtually no front panel controls. After "SWITCH" has been initialized, the display of the calculator always shows the present setup state of the interface unit. This includes an indication of the control voltage output.

3-9. Initializing "SWITCH"

To initialize "SWITCH", simply press <shift> K11 while "3047CK" is executing. After initialization, the following should be displayed on the -hp-9845T (if the -hp- 35601A is in its turn-on mode).

```

K0 ... TOGGLE OVERLOAD
K1 ... TOGGLE OUT OF LOCK
K2 ... CHANGE DAC
K3 ... CHANGE GAIN1
K4 ... CHANGE GAIN2
K5 ... CHANGE LEAD LAG
K6 ... CHANGE ATTENUATION1
K7 ... CHANGE ATTENUATION2
<SHIFT> K11 .. RETURN TO MAIN PROGRAM

```

INTERFACE SETUP

```

DAC VOLTAGE = 0          CONTROL VOLTAGE OUTPUT = 0
GAIN1 (dB) = 0
GAIN2 (dB) = 6
LEADLAG FILTER = 0
ATTEN1 = 0
ATTEN2 = 1

```

F0

PRESS ONE OF THE ABOVE KEYS OR ENTER COMMAND STRING

3-10. Special Function Keys

The first nine items on the menu show the definitions of the special function keys. K0 and K1 turn off the overload and out-of-lock indicators on the front panel. K2 through K7 are used to change various parameters of the signal path in the Phase-Locked Loop Control board. When one of these keys (K2-K7) is pressed, the calculator displays a prompt for a value. When the value of the parameter is entered, and CONTINUE is pressed, the display is updated showing the present state of the -hp- 35601A. Pressing <shift> K11 returns the user to the main program "3047CK".

K0 ... Toggle Overload

Pressing this key resets the Overload Flip-Flop on the A5 board which turns off the OVERLOAD indicator on the front panel of the -hp- 35601A. If an overload condition still exists, however, the Overload Flip-Flop will immediately set again. In this case, the front panel indicator will remain on. Pressing K0 will not turn the indicator on (i.e. set the Overload Flip-Flop) if it is off.

K1 ... Toggle Out-of-Lock

Pressing this key resets the Out-of-Lock Flip-Flop on the A5 board which turns off the OUT-OF-LOCK indicator on the front panel of the -hp- 35601A. If an out-of-lock condition still exists, the Out-of-Lock Flip-Flop will immediately set again. In this case, the front panel indicator will remain on. Pressing K1 will not turn the indicator on if it is off.

K2 ... Change DAC

When this key is pressed the display prompts the operator to enter a number from -10 to 10. When this number is entered and CONTINUE is pressed, the -hp- 9845T sends the appropriate data to the -hp- 35601A. (The number must be a multiple of 0.04 or the software will round the absolute value of the number to the lower multiple of 0.04.) In addition, the calculator display is updated to show the present output voltage of the DAC.

K3 ... Change Gain1

This key affects the gain of the 0-28dB Amplifier. When the computer prompts the user to enter a number, a multiple of 4 from 0 to 28 should be entered, followed by pressing CONTINUE. The -hp- 9845T will change the gain to the value entered and update its display to reflect the change.

K4 ... Change Gain2

This key affects the gain of the 6-20dB Amplifier. When the computer prompts the user to enter a number, a multiple of 2 from 6 to 20 should be entered, followed by pressing CONTINUE. The -hp- 9845T will change the gain to the value entered and update its display to reflect the change.

K5 ... Change Lead Lag

This key changes the lead/lag characteristics of the phase-locked loop on the A5 board. When the calculator prompts the user, a number from 0 to 7 should be entered followed by pressing CONTINUE. The calculator will change the lead/lag number to the entered value and update its display to reflect the change.

K6 ... Change Attenuation1

Pressing this key enables the user to change the attenuation of the 0-20dB Attenuator. The -hp- 9845T prompts the user to enter a number (1, .5, .2, or .1) that represents the ratio of the output voltage to the input voltage of the attenuator. When CONTINUE is pressed, the state of the attenuator is changed and the calculator display is updated.

K7 ... Change Attenuation2

Pressing this key enables the user to select the attenuation of the 0 or 6dB Attenuator. The -hp- 9845T prompts the user to enter a number (1 or .5) that represents the ratio of the output voltage to the input voltage of the attenuator. When CONTINUE is pressed, the state of the attenuator is changed and the calculator display is updated.

<shift> K11 ... Return to Main Program

Pressing this key returns the user to the main program "3047CK". After troubleshooting with "SWITCH", the Functional Test or Diagnostic Test may be repeated or continued after pressing this key.

3-11. Entering a Command String

To Change the state of the switches and relays shown in Figure 3-4, a command string must be entered. A command simply consists of the switch number shown in the block diagram in Figure 3-4 for a particular switch. The possible switch numbers are shown in Table 3-2.

When a "SWITCH" command is entered, and continue is pressed, the command is displayed. A displayed command (with the prefix K, S, or L) indicates that the corresponding switch or relay is in the state opposite to that shown in the block diagram (Figure 3-4). The commands that have an F prefix control the cut-off frequency of the Switchable Lowpass Filter; for this reason, one of these commands is always displayed. To return a switch or relay to the state shown in the block diagram, enter the command preceded by a minus sign. Command strings are performed by entering multiple commands separated by commas.

Table 3-2. "SWITCH" Commands

Commands	Function
K1, K2, K3, K4, K5, K6, K7, K8, K9, K10, K11, K12, K13, K14	Relays on the A4 board
S1, S2, S3, S4, S5, S6, S7, S8 (only one of S5, S6, S7, and S8 may be selected)	Switches on the A5 board
F0, F1, F2 (one of these will always be on displayed)	Switchable Lowpass Filter the A3 board
L0, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21	Switches on the A3, A6, and A7 boards

SECTION IV

REPLACEABLE PARTS

4-1. INTRODUCTION

This section contains information for ordering replacement parts. Starting with table 4-3 parts are listed in alphanumeric order of their mechanical part reference designators; indicated are descriptions, -hp- part numbers, and any applicable notes. Also, at the end of this section are schematics for the power control unit. The following is included:

- -hp- part number
- The total quantity of the part used in the instrument (Qty column). This number is only shown the first time the part appears.
- Descriptions of the part (see the list of abbreviations in Table 4-1).
- Typical manufacturer of the part in a five-digit code (see Table 4-2 for a list of manufacturers).
- Manufacturers part number.

4-2. ORDERING INFORMATION

To obtain replacement parts, address the order or inquiry to your local Hewlett-Packard Field Office. (See the list at the end of this manual for office locations.) Identify parts by their Hewlett-Packard part numbers. Include the instrument's model number (-hp-3047A) and its serial number.

Table 4-1. Standard Abbreviations.

ABBREVIATIONS									
Ag	silver	Hz	hertz (cycle/s) per second	NPO	negative positive zero (zero temperature coefficient)	sl	slide		
Al	aluminum	ID	inside diameter	ns	nanosecond(s) = 10^{-9} seconds	SPDT	single-pole double-throw		
Au	gold	imp	impregnated	nsr	not separately replaceable	SPST	single-pole single-throw		
C	capacitor	ins	insulation(ed)	Ω	ohm(s)	Ta	tantalum		
cer	ceramic	in	inch	obd	order by description	TC	temperature coefficient		
coef	coefficient	k Ω	kiloohm(s) = 10^3 ohms	OD	outside diameter	TiO ₂	titanium dioxide		
com	common	kHz	kilohertz = 10^3 hertz			tol	tolerance		
comp	composition	L	inductor	p	peak	trim	trimmer		
conn	connection	lin	linear taper	pA	picoampere(s)	TSTR	transistor		
dep	deposited	log	logarithmic taper	pc	printed circuit				
DPDT	double-pole double-throw	mA	milliampere(s) = 10^{-3} amperes	pF	picofarad(s) = 10^{-12} farads	V	volt(s)		
DPST	double-pole single-throw	MHZ	megahertz = 10^6 hertz	piv	peak inverse voltage	vacw	alternating current working voltage		
elect	electrolytic	MD	megohm(s) = 10^6 ohms	p/o	part of	var	variable		
encap	encapsulated	met film	metal film	pos	position(s)	vdw	direct current working voltage		
F	farad(s)	ms	millisecond	pot	potentiometer	W	watt(s)		
FET	field effect transistor	mtg	mounting	p-p	peak-to-peak	w/	with		
fxd	fixed	mV	millivolt(s) = 10^{-3} volts	ppm	parts per million	wiv	working inverse voltage		
		μ F	microfarad(s)	prec	precision (temperature coefficient, long term stability and/or tolerance)	w/o	without		
GaAs	gallium arsenide	μ s	microsecond(s)	R	resistor	ww	wirewound		
GHz	gigahertz = 10^9 hertz	μ V	microvolt(s) = 10^{-6} volts	Rh	rhodium				
gd	guarded	my	Mylar	rot	rotary				
Ge	germanium	nA	nanoampere(s) = 10^{-9} amperes						
gnd	ground(ed)	NC	normally closed	Se	selenium				
H	henry(ies)	Ne	neon	sect	section(s)				
Hg	mercury	NO	normally open	Si	silicon				
DESIGNATORS									
A	assembly	FL	filter	Q	transistor	TS	terminal strip		
B	motor	HR	heater	QCR	transistor-diode	U	microcircuit		
BT	battery	IC	integrated circuit	R(p)	resistor(pack)	V	vacuum tube, neon bulb, photocell, etc.		
C	capacitor	J	jack	RT	thermistor	W	wire		
CR	diode or thyristor	K	relay	S	switch	X	socket		
DL	delay line	L	inductor	T	transformer	XDS	lampholder		
DS	lamp	M	meter	TB	terminal board	XF	fuseholder		
E	misc electronic part	MP	mechanical part	TC	thermocouple	Y	crystal		
F	fuse	P	plug	TP	test point	Z	network		

4.3. PARTS NOT LISTED

To obtain a part not listed include the following information:

- Instrument model number
- Instrument serial number
- A description of the part
- The function and location of the part

4.4. DIRECT MAIL ORDER SYSTEM

Within the United States, Hewlett-Packard can supply parts through a direct mail order system. Guidelines for using this ordering system are as follows:

- Order parts directly from the -hp- Parts Center in Mountain View, California.
- No minimum or maximum purchase requirements for any mail order. (A minimum order amount is required for parts ordered through a local -hp- Sales and Service Office when orders require billing and invoicing.)
- Prepay transportation charges.
- Include a check or money order with each order.
- Mail-order forms and specific ordering information is available through your local -hp- Sales and Service Office. See the list at the back of this manual for addresses and phone numbers of your local -hp- office.

Table 4-2. Manufacturers Code List

Mfr. No.	Manufacturer Name	Address
00359	OHara Metal Products	San Francisco, CA 94107
00394	Graysix	Berkley, CA 94710
00779	Amp Inc	Harrisburg, PA 17105
01125	Lewis Screw Co	Chicago, IL 60608
04009	Arrow-Hart Inc	Hartford, CT 06106
04234	Delbert Blinn Co	Pomona, CA 91766
04866	Nylok-Detroit Corp	Troy, MI 48084
05464	Industrial Electronic Engineers Inc	Van Nuys, CA 91405
06004	Bassick Div Stewart-Warner Corp	Bridgeport, CT 06602
06383	Panduit Corp	Tinley Park, IL 60477
15526	Metric & Multistandard Cmpnt Corp	Elmsford, NY 10523
16428	Belden Corp	Richmond, IN 47374
18121	Wilshire Foam Products Inc	Torrance, CA 90503
24931	Specialty Connector Co Inc	Greenwood, IN 46227
28480	Hewlett-Packard Co	Palo Alto, CA 94303
28520	Heyman Mfg Co	Kentworth, NJ 07033
28875	IMC Magnetics Corp NH Div	Rochester, NH 03867
31918	ITT Schadow	Minneapolis, MN 55426
37281	Air Filter Sales & Service	San Francisco, CA 98100
40931	Honeywell, Inc	Minneapolis, MN 55408
59730	Thomas & Betts Co The	Elizabeth, NJ 07207
73734	Federal Screw Products Co	Chicago, IL 60618
74193	Heinemann Electric Co	Trenton, NJ 08602
78553	Tinnerman Products Inc	Cleveland, OH 44101
79725	Wiremold Co The	Hartford, CT 06110
81541	Airpax Electronics Inc	Cambridge, MD 21613
82877	Rotron Inc	Woodstock, NY 12498
83508	Grant Pulley & Hardware Co	West Nyack, NY 10994
89020	Amerace Corp Control Prod Div	Union, NJ 07086
98410	ETC Distribution Inc	Pinellas Park, FL 44103

Table 4-3. Replaceable Parts for the -hp- 29431B Cabinet

Ref Des	-hp- Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	29431-60001	4	1	ASSY-FRAME	28480	29431-60001
2	29431-00016	5	2	SIDE PNL-BLANK	28480	29431-00016
3	29431-60010	5	1	ASSY-FNT DOOR	28480	29431-60010
4	29431-60011	6	1	ASSY-DOOR,REAR	28480	29431-60011
5	5180-0132	6	1	CABINET TOP (CAP)	28480	5180-0132
6	02145-00033	3	1	STD TRIM STRIP	28480	02145-00033
7	2510-0104	0	8	SCREW, 8-32 .438-IN-LG 100 DEG	00000	ANY SATISFACTORY SOURCE
8	3020-0035	8	8	SCREW-SKT HD CAP 3/8-16 1-IN-LG ALY STL	00000	ANY SATISFACTORY SOURCE
9	1492-0081	1	4	CASTER-SWVL PL 2.5-IN-WHL-DIA 175-LB-CAP	06004	2689-1
10	29421-20013	2	4	LEVELER 2.5	28480	29421-20013
11	29430-00022	2	4	HINGE-FEMALE	28480	29430-00022
12	0460-1204	4	4	TAPE-INDL .375-IN-W .187-IN-T POLYU	18121	SCOTT PYRELL
13	3050-0139	6	2	WASHER-FL MTLC NO. 8N .172-IN-ID	00000	ANY SATISFACTORY SOURCE
14	2510-0049	2	2	SCREW-MACH 8-32 .5-IN-LG PAN-HD POZI	00000	ANY SATISFACTORY SOURCE
15	3050-0881	5	16	WASHER-FL MTLC 5/17 IN .344-IN-ID	00000	ANY SATISFACTORY SOURCE
16	2190-0432	7	16	WASHER-LK HLCL 5/16 IN .319-IN-ID	00000	ANY SATISFACTORY SOURCE
17	2950-0047	2	16	NUT-HEX-DBL-CHAM 5/16-18-THD .219-IN-THK	00000	ANY SATISFACTORY SOURCE
18	3050-0019	1	4	WASHER-FL MTLC NO. 10 .2-IN-ID .5-IN-OD	00000	ANY SATISFACTORY SOURCE
19	2190-0034	5	4	WASHER-LK HLCL NO. 10 .194-IN-ID	00000	ANY SATISFACTORY SOURCE
20	2680-0103	8	4	SCREW-MACH 10-32 .5-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
21	2510-0106	2	8	SCREW-MACH 8-32 .5-IN-LG	00000	ANY SATISFACTORY SOURCE
22	2580-0003	5	8	NUT-HEX-W/LKWR 8-32-THD .125-IN-THK	00000	ANY SATISFACTORY SOURCE
23	0510-0014	9	3	NUT-SHMET 8-32-THD .156-IN-THK .52-WD	78553	C 7941-832-24B
24	29430-00034	6	4	BRACKET-LIFTING	28480	29430-00034
25	2190-0792	2	8	WASHER-LK HLCL 3/8 IN .382-IN-ID	00000	ANY SATISFACTORY SOURCE
27	7120-0134	4	1	LABEL-BLANK 1-IN-WD 2-IN-LG AL	28480	7120-0134

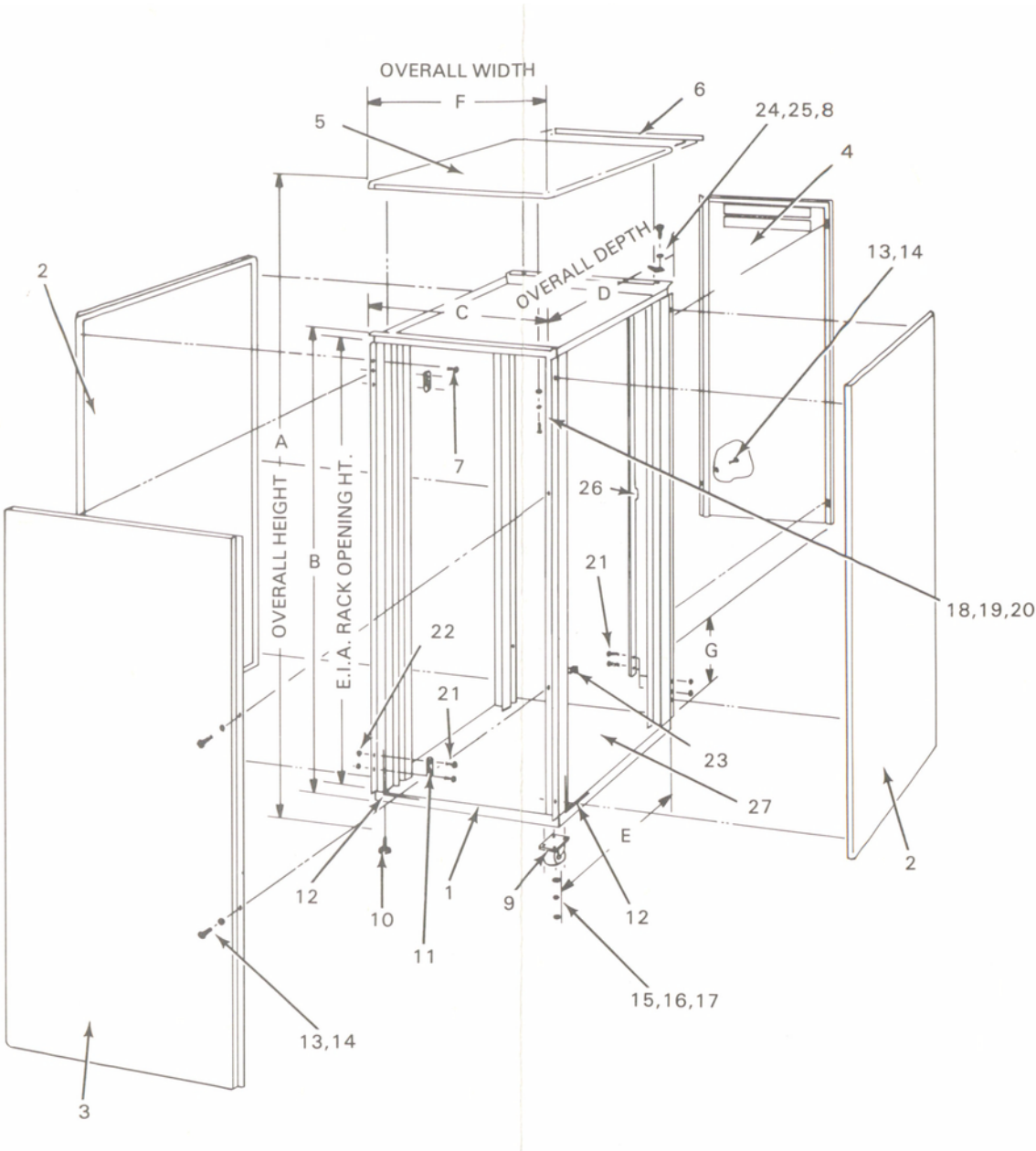
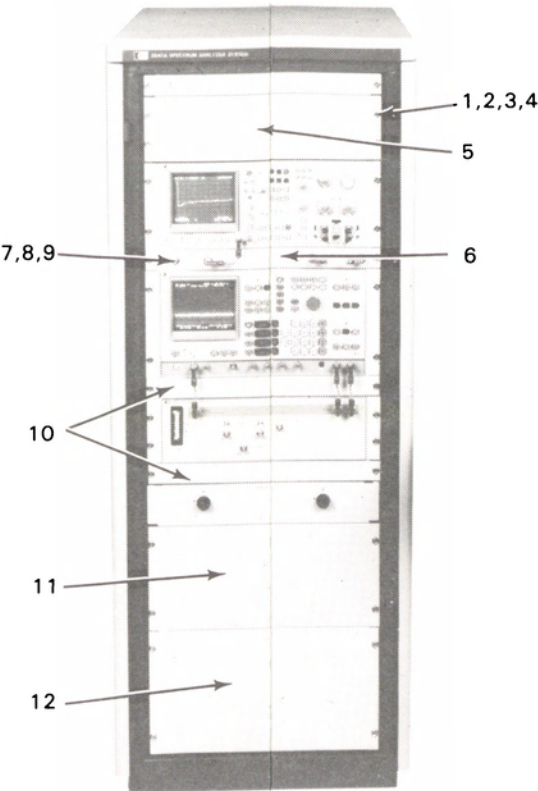


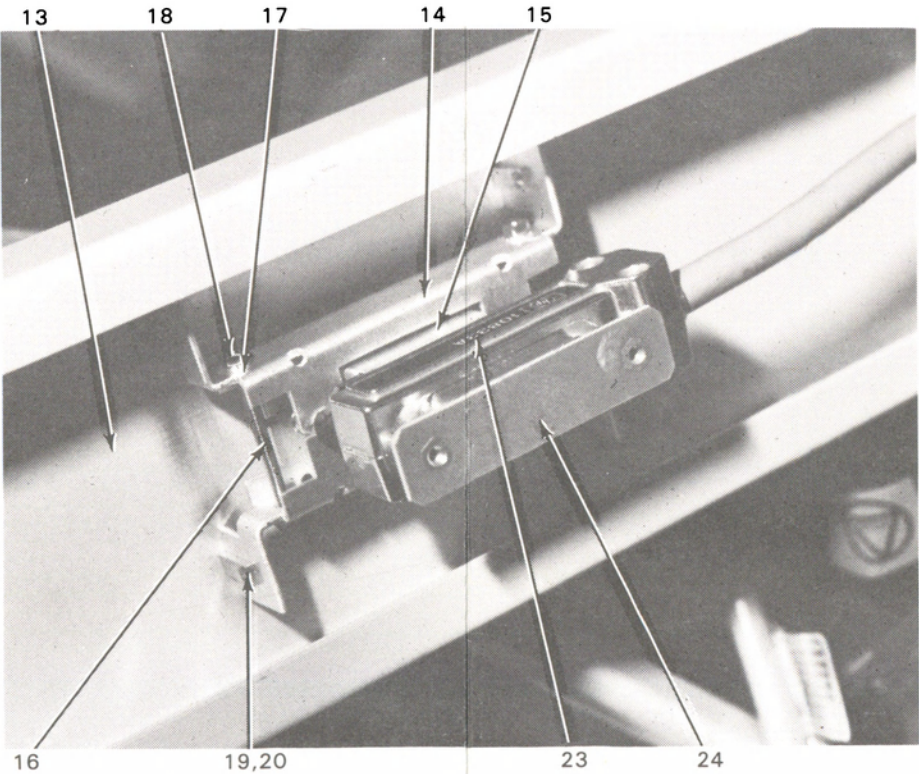
Figure 4-1. Exploded View of 29431 Cabinet
4-3/4-4

Table 4-4. Replaceable Parts For Rack-Mount Items

Ref Des	-hp Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	0590-1366	4	20	NUT-SHMET-U-TP 10-32-THD .125-IN-THK	00000	ANY SATISFACTORY SOURCE
2	2680-0106	1	20	SCREW-MACH 10-32 .625-IN-LG 100 DEG	00000	ANY SATISFACTORY SOURCE
3	3050-0007	7	20	WASHER-CPD NO. 10 .25-IN-ID .578-IN-OD	73734	1488
4	3050-0248	8	20	WASHER-FNSH NO. 10 .219-IN-ID .555-IN-OD	04234	NW-15-10
5	12682-01002	9	1	BLANK PANEL	28480	12682-01002
6	03047-04301	9	1	PATCH PANEL FD THRW	28480	03047-04301
7	1250-0161	6	4	ADAPTER-COAX STR F-BNC F-BNC	24931	28AS101-2
8	2190-0054	9	4	WASHER-LK INTL T 1/2 IN .505-IN-ID	00000	ANY SATISFACTORY SOURCE
9	2950-0054	1	4	NUT-HEX-DBL-CHAM	00000	ANY SATISFACTORY SOURCE
10	12680-01002	7	2	PANEL BLANK-FRT 1.75-IN	28480	12680-01002
11	12684-01002	1	1	PANEL BLANK-FRT 8.75-IN	28480	12684-01002
12	12685-01002	2	1	10.25" BLANK PANEL	28480	12685-01002
13	03047-00201	0	1	HP-IB PANEL	28480	03047-00201
14	03047-01201	2	2	HP-IB FILTER BRACKET	28480	03047-01201
15	9135-0159	6	1	FILTER-LINE	00779	841928-1
16	0515-0230	1	2	SCREW-MACH M3 X 0.5 35MM-LG PAN-HD	01125	ORDER BY DESCRIPTION
17	2190-0020	9	2	WASHER-LK HLCL NO. 5 .128-IN-ID	00000	ANY SATISFACTORY SOURCE
18	0515-0004	7	2	SCREW-MACH M3 X 0.5 8MM-LG 90-DEG-FLH-HD	02738	M3X8 DIN 7987
19	0515-0211	8	4	SCREW-MACH M3 X 0.5 6MM-LG PAN HD	00000	ANY SATISFACTORY SOURCE
20	3050-0066	8	4	WASHER-FL MTLC NO. 6 .147-IN-ID	73734	ORDER BY DESCRIPTION
21	2680-0111	8	4	SCREW-MACH 10-32 1-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
22	2190-0034	5	4	WASHER-LK HLCL NO. 10 .194-IN-ID	00000	ANY SATISFACTORY SOURCE
23	5060-9455	0	1	HP-IB CABLE 1M	28480	5060-9455
24	03047-01202	3	1	BRACKET-HP-IB-CABLE	28480	03047-01202
25	2680-0111	8	4	SCREW-MACH 10-32 1-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
26	2190-0034	5	4	WASHER-LK HLCL NO. 10 .194-IN-ID	00000	ANY SATISFACTORY SOURCE
27	2190-0402		4	WASHER-FL MTLC NO. 10 .203-IN-ID	00000	ANY SATISFACTORY SOURCE



Rack-Mounted Items In -hp- 3047



HP-IB Panel Detail

Figure 4-2. Rack-Mounted Items in -hp- 3047A
4-5/4-6

Table 4-5. Replaceable Parts For Power Panel

Ref Des	-hp- Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	03047-04302	0	1	POWER PANEL	28480	03047-04302
2	3101-2216	3	1	SWITCH-PB DPDT ALTNG 4A 250 VAC	31918	600351-NE15
3	03047-01203	4	1	BRACKET SWITCH	28480	03047-01203
4	0515-0211	8	4	SCREW-MACH M3 X 0.5 6MM-LG PAN HD	00000	ANY SATISFACTORY SOURCE
5	0535-0004	9	2	NUT-HEX DBL-CHAM M3 X 0.5 2.4MM-THK	00000	ANY SATISFACTORY SOURCE
6	5001-1868	9	1	KEYCAP-PRINTD	28480	5001-1868
7	5040-7675	0	1	PUSH ROD-SW	28480	5040-7675
8	1450-0614	8	1	LIGHT-INDICATOR	28480	1450-0614
9	2140-0245	5	1	LAMP INCAND 387 28VDC 40MA T-1-3/4-BULB	05464	387
10	03047-61609	0	1	CABLE-SWITCH	28480	03047-61609
11	1400-0440	3	1	CABLE TIE .062-1.75-DIA .184-WD NYL	06383	PLC2S-S10-M
12	0515-0210	7	1	SCREW-MACH M4 X 0.7 8MM-LG PAN-HD	00000	ANY SATISFACTORY SOURCE

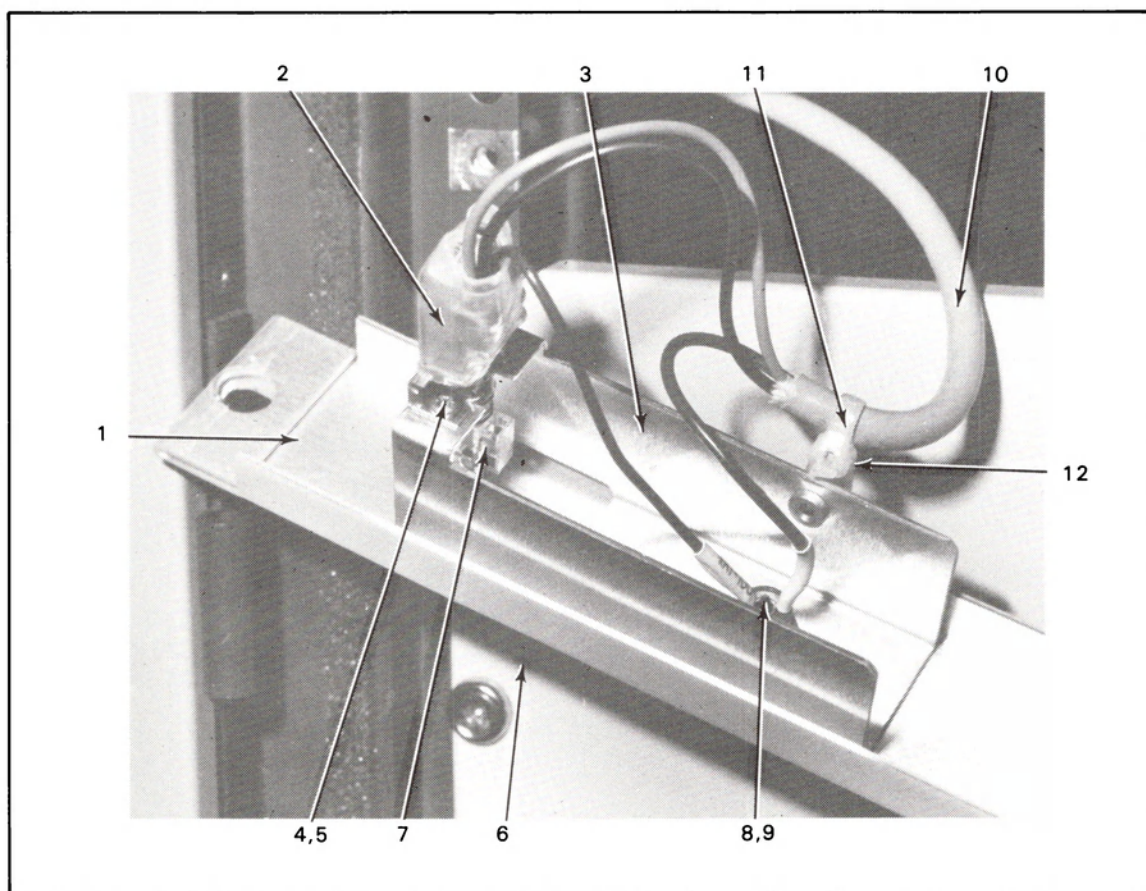


Figure 4-3. Power Panel Detail

Table 4-6. Replaceable Parts For Writing Surface

Ref Des	hp- Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	03047-04701	3	2	RAIL INST SUP	28480	03047-04701
2	2940-0103	0	4	SCREW-CAP 1/4-20 .5-IN-LG HEX-HD-STL	00000	ANY SATISFACTORY SOURCE
3	2190-0032	3	4	WASHER-LK HLCL 1/4 IN .255-IN-ID	00000	ANY SATISFACTORY SOURCE
4	2950-0031	4	4	NUT-HEX-DBL-CHAM 1/4-20-THD .219-IN-THK	00000	ANY SATISFACTORY SOURCE
5	03047-05001	8	1	WRIT SU-RF RETAINER	24840	03047-05001
6	0515-0071	8	2	SCREW-MACH M4 X 0.7 16MM-LG PAN-HD	01125	ORDER BY DESCRIPTION
7	3050-0071	5	4	WASHER-FL MTLC NO. 8 .169-IN-ID	00000	ANY SATISFACTORY SOURCE
8	2190-0073	2	2	WASHER-LK HLCL NO. 8 .168-IN-ID	00000	ANY SATISFACTORY SOURCE
9	0535-0006	1	8	NUT-HEX DBL-CHAM M4 X 0.7 3.2MM-THK	00000	ANY SATISFACTORY SOURCE
10	1490-0868	8	1	SLIDE-CHAS 13.875-LG 14.781-TRVL	83508	SS-168-NT-14
11	03047-04306	4	2	SLIDE MTNG PANEL	28480	03047-04306
12	2680-0106	1	4	SCREW-MACH 10-32 .625-IN-IG 100 DEG	00000	ANY SATISFACTORY SOURCE
13	03047-04702	4	2	SUPPORT RAIL MTG	28480	03047-04702
14	0515-0071	8	8	SCREW-MACH M4 X 0.7 16MM-LG PAN-HD	01125	ORDER BY DESCRIPTION
15	3050-0071	5	16	WASHER-FL MTLC NO. 8 .169-IN-ID	00000	ANY SATISFACTORY SOURCE
16	2190-0073	2	8	WASHER-LK HLCL NO. 8 .168-IN-ID	00000	ANY SATISFACTORY SOURCE
17	0535-0006	1	8	NUT-HEX DBL-CHAM M4 X 0.7 3.2MM-THK	00000	ANY SATISFACTORY SOURCE
18	0515-0212	9	6	SCREW-MACH M3.5 X0.6 6MM-LG PAN-HD	00000	ANY SATISFACTORY SOURCE
19	3050-0066	8	12	WASHER-FL MTLC NO. 6 .147-IN-ID	73734	ORDER BY DESCRIPTION
20	03047-24701	5	2	WR SUR SUPPORT BRKT	28480	03047-24701
21	03047-20101	1	1	DECK WRITING SURFACE	28480	03047-20101
22	0624-0029	7	6	SCREW-WOOD SIZE 8 .75-IN-LG RD-HD-SLT	00000	ANY SATISFACTORY SOURCE
23	3050-0071	5	4	WASHER-FL MTLC NO. 8 .169-IN-ID	00000	ANY SATISFACTORY SOURCE
24	03047-04304	2	1	FRONT PANEL WR SURF	28480	03047-04304
25	1390-0589	8	2	FASTENER-LATCH ADJ PAWL GRIP RANGE	00000	ANY SATISFACTORY SOURCE
26	3050-0128	3	2	WASHER-FL MTLC 9/16 IN .63-IN-ID	00000	ANY SATISFACTORY SOURCE
27	2190-0575	9	2	WASHER-LK INTL T 1/2 IN .64-IN-ID	00000	ANY SATISFACTORY SOURCE

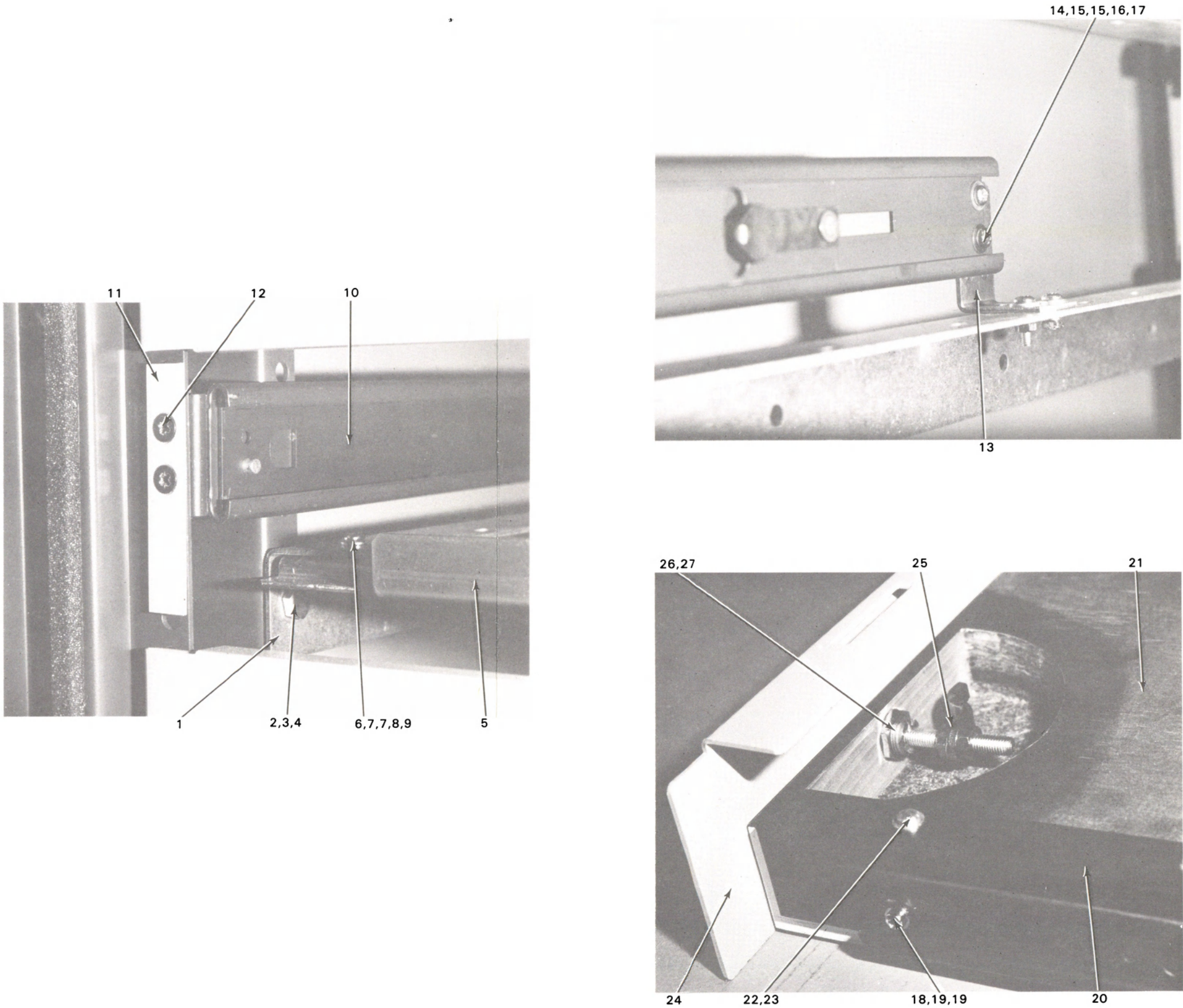


Figure 4-4. Writing Surface Detail
4-9/4-10

Table 4-7. Replaceable Parts For Instrument Installation Hardware

Ref Des	hp- Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	0590-1366	1	12	RK MT RETAINER NUTS	00000	ANY SATISFACTORY SOURCE
2	2510-0193	7	12	SCREW-MACH 8-32 .375-IN-LG PAN-HD-POZI	04866	YELLOW PATCH
3	2680-0106	1	12	SCREW-MACH 10-32 .625-IN-LG 100 DEG	00000	ANY SATISFACTORY SOURCE
4	3050-0007	7	12	WASHER-CPD NO. 10 .25-IN-ID .578-IN-OD	73734	1488
5	3050-0248	8	12	WASHER-FNSH NO. 10 .219-IN-ID .555-IN-OD	04234	NW-15-10
6	5020-8862	7	2	FLANGE-RACK MT	28480	5020-8862
7	5061-0072	1	1	RACK MT KIT	28480	5061-0072
8	5020-8863	8	2	FLANGE	28480	5020-8863
9	03047-04701	3	2	RAIL INST SUP	28480	03047-04701
10	2940-0103	0	4	SCREW-CAP 1/4-20 .5-IN-LG HEX-HD STL	00000	ANY SATISFACTORY SOURCE
11	2190-0032	3	4	WASHER-LK HLCL 1/4 IN .255-IN-ID	00000	ANY SATISFACTORY SOURCE
12	2950-0031	4	4	NUT-HEX-DBL-CHAM 1/4-20-THD .219-IN-THK	00000	ANY SATISFACTORY SOURCE
13	03047-04702	4	2	SUPPORT RAIL MTG	28480	03047-04702
14	0515-0071	8	6	SCREW-MACH M4 X 0.7 16MM-LG PAN-HD	01125	ORDER BY DESCRIPTION
15	3050-0071	5	12	WASHER-FL MTLC NO. 8 .169-IN-ID	00000	ANY SATISFACTORY SOURCE
16	2190-0073	2	6	WASHER-LK HLCL NO. 8 .168-IN-ID	00000	ANY SATISFACTORY SOURCE
17	0535-0006	1	6	NUT-HEX DBL-CHAM M4 X 0.7 3.2MM-THK	00000	ANY SATISFACTORY SOURCE
18	2360-0117	6	6	SCREW-MACH 6-32 .375-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
19	3050-0066	8	12	WASHER-FL MTLC NO. 6 .147-IN-ID	73734	ORDER BY DESCRIPTION

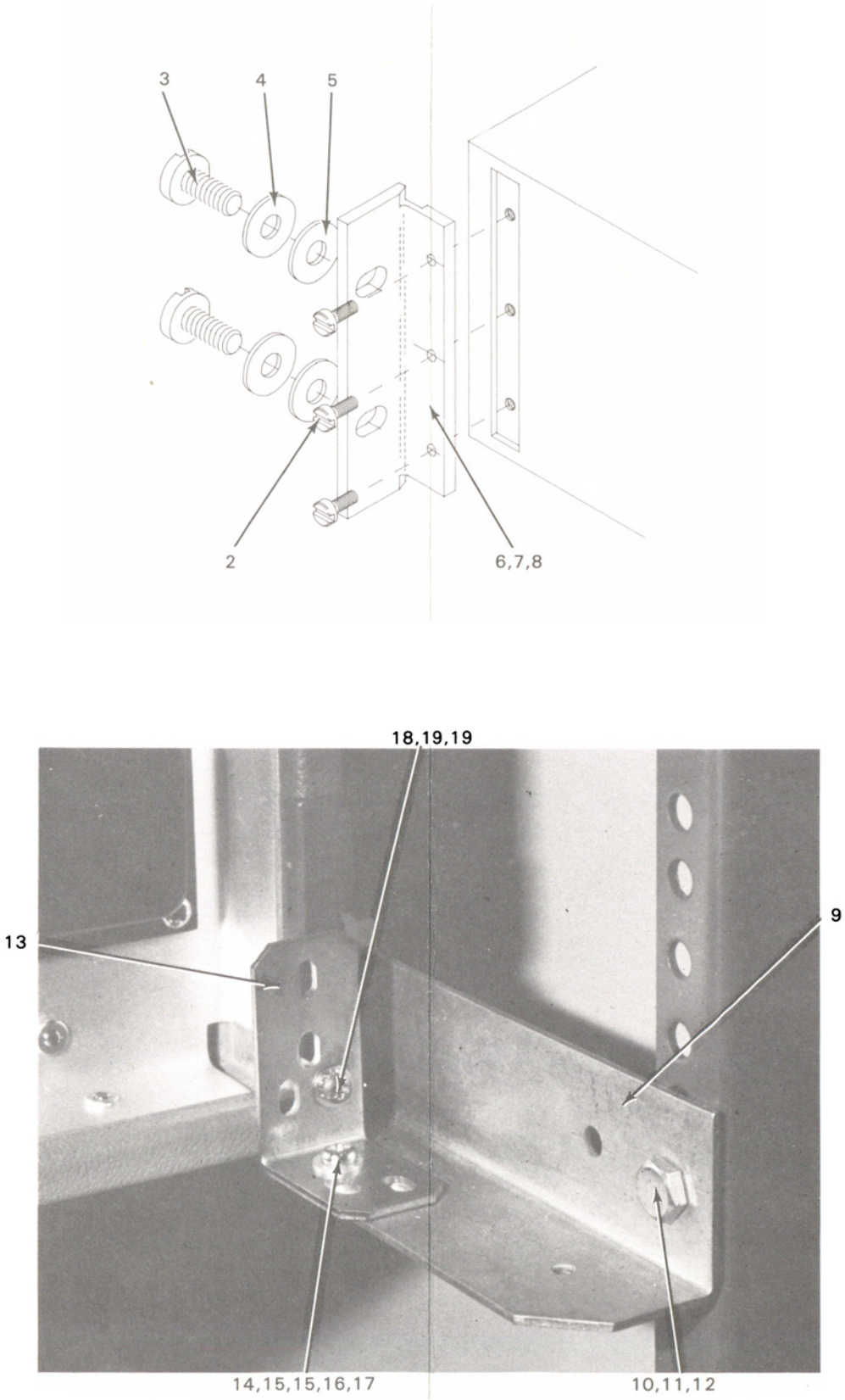


Figure 4-5. Instrument Installation Hardware
4-11/4-12

Table 4-8. Replaceable Parts For Power Strip

Ref Des	hp Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	1251-3969	0	6	BRACKET-MOUNTING FOR AC PWR MULT OUT	00394	G6-3969
2	2510-0121	1	6	SCREW-MACH 8-32 .375-IN-LG 82 DEG	00000	ANY SATISFACTORY SOURCE
3	2580-0003	5	6	NUT-HEX-W/LKWR 8-32-THD .125D-IN-THK	00000	ANY SATISFACTORY SOURCE
4	1251-3669	7	2	CONNECTOR-AC PWR CEE-22 FEM OUT-STRP STL	79725	E33172

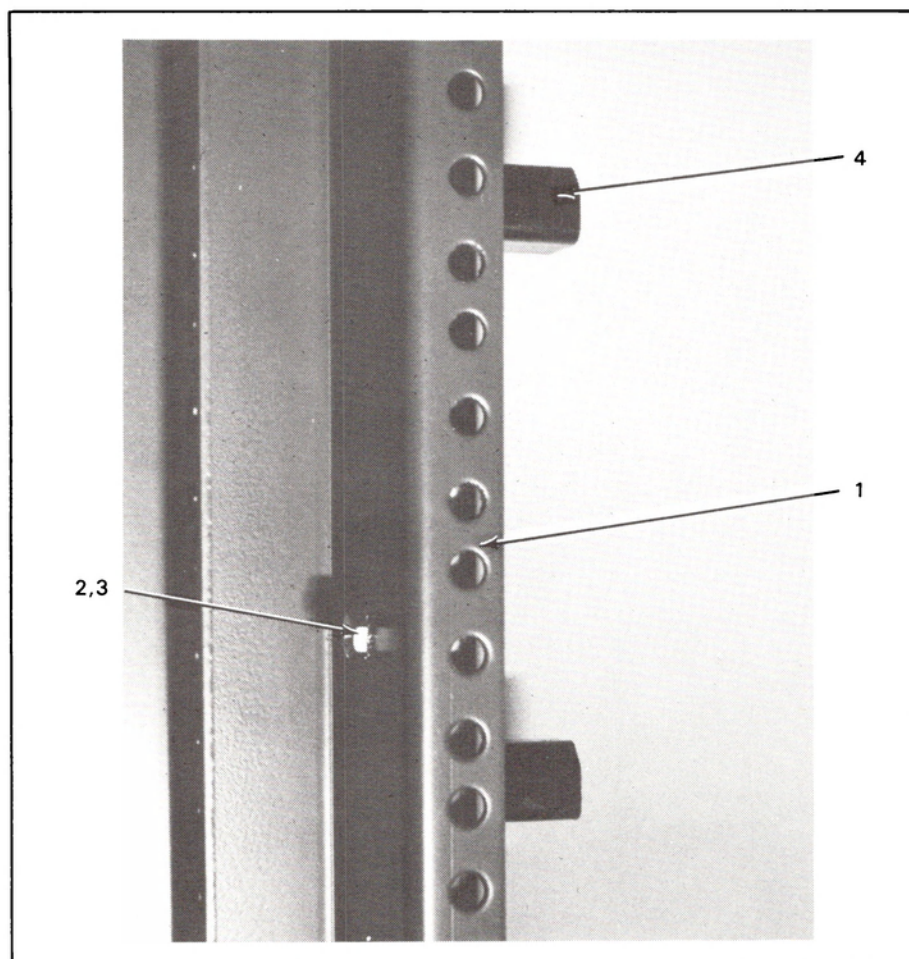
**Figure 4-6. Power Strip Detail**

Table 4-9. Replaceable Parts For Power Supply

Ref Des	hp Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	03047-60076	3		POWER SUPPLY	28480	03047-60076
	03047-60081	0		POWER SUPPLY	28480	03047-60081
	02940-01238	5	1	INSPECTION PLATE (Attaching Parts)	28480	02940-01238
2	2360-0115	4	4	SCREW-MACH 6-32 .312-IN-LB PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
2A	3050-0228	4	4	WASHER-FL MTLC NO. 6 .156-IN-ID	00000	ANY SATISFACTORY SOURCE
3			1	POWER CONTROL UNIT (See Figure 4-8)(Attaching Parts)		
4	2360-0115	4	4	SCREW-MACH 6-32 .312-IN-LB PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
4A	3050-0228	4	4	WASHER-FL MTLC NO. 6 .156-IN-ID	00000	ANY SATISFACTORY SOURCE
5	3105-0038	1	1	CIRCUIT BREAKER 3P 10A 250VAC CSA	81541	UPL-111-1-6-1-103
	3105-0039	2	1	CIRCUIT BREAKER 3P 20A 250VAC CSA (Attaching Parts)	74193	AM3-A3-A-20-3
6	2360-0115	4	4	SCREW-MACH 6-32 .312-IN-LB PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
6A	3050-0228	4	4	WASHER-FL MTLC NO. 6	00000	ANY SATISFACTORY SOURCE
7	0100-0408	6	1	CONDUIT CONNECTOR STR; 1.0 IN IPS PIPE	59730	3304M
8	02940-01237	4	1	CONDUIT PLATE (Attaching Parts)	28480	02940-01237
9	2360-0113	2	4	SCREW-MACH 6-32 .25-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
10	0626-0001	9	1	SCREW-TPG 6-20 .25-IN-LG PAN-HD-PHL	00000	ANY SATISFACTORY SOURCE
11	3150-0097	7	1	FILTER-AIR 30 PORES/IN FOAM 10.375-WD	37281	ORDER BY DESCRIPTION
12	02940-01357	9	1	CLIP-FILTER (Attaching Parts)	28480	02940-01357
13	2580-0006	8	1	NUT-HEX-W/LKWR 8-32-THD .125-IN-THK	00000	ANY SATISFACTORY SOURCE
14	2510-0103	9	1	SCREW-MACH 8-32 .375-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
15	02940-00214	5	1	BRACKET-FILTER (Attaching Parts)	28480	02940-00214
16	2580-0006	8	1	NUT-HEX-W/LKWR 8-32-THD .125-IN-THK	00000	ANY SATISFACTORY SOURCE
17	2510-0103	9	1	SCREW-MACH 8-32 .375-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
18	3160-0213	0	1	FINGER GUARD (Attaching Parts)	00359	ORDER BY DESCRIPTION
19	2580-0006	8	4	NUT-HEX-W/LKWR 8-32-THD .125-IN-THK	00000	ANY SATISFACTORY SOURCE
20	3050-0071	5	4	WASHER-FL MTLC NO. 8 .169-IN-ID	00000	ANY SATISFACTORY SOURCE
21	2510-0107	3	4	SCREW-MACH 8-32 .5-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
21A	3050-0139	6	1	WASHER-FL MTLC NO. 8 .172-IN-ID	00000	ANY SATISFACTORY SOURCE
22	1400-0786	0	1	MOUNT-CA TIE .19-DIA .375-WD NYL	06383	TA1S8
22A	1400-0342	4	1	CABLE-TIE 1.25-DIA .135-WD NYL	06383	STA STRAP SST-1.5-I-M-8
23	2580-0006	8	4	NUT-HEX-W/LKWR 8-32-THD .125-IN-THK	00000	ANY SATISFACTORY SOURCE
24	2510-0103	9	4	SCREW-MACH 8-32 .375-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
25	0362-0395	4	1	TERMINAL-CRIMP R-TNG NO. 8 22-18-AWG RED	98410	AA-821-08-T
26	0362-0341	0	2	WIRE NUT BRS YTL INSUL .25-IN-OD	00779	35115
28	8120-2347	6	1	FAN CORD ASSY 18-AWG 2-COND	82877	428056
29	2580-0006	8	4	NUT-HEX-W/LKWR 8-32-THD .125-IN-THK	00000	ANY SATISFACTORY SOURCE
30	2510-0107	3	4	SCREW-MACH 8-32 .5-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
31	3050-0071	5	4	WASHER-FL MTLC NO. 8 .169-IN-ID	00000	ANY SATISFACTORY SOURCE
32	3160-0213	0	1	FINGER GUARD	00359	ORDER BY DESCRIPTION
33	3160-0210	7	1	FAN-TBAX 550-CFM 115V 50/60-HZ 10-OD	28875	CONDOR MODEL 10
	3160-0211	8	1	FAN-TBAX 550-CRM 230V 50/60-HZ 10-OD	28875	CONDOR MODEL 20
34	02940-01232	9	1	PANEL-POWER	28480	02940-01232

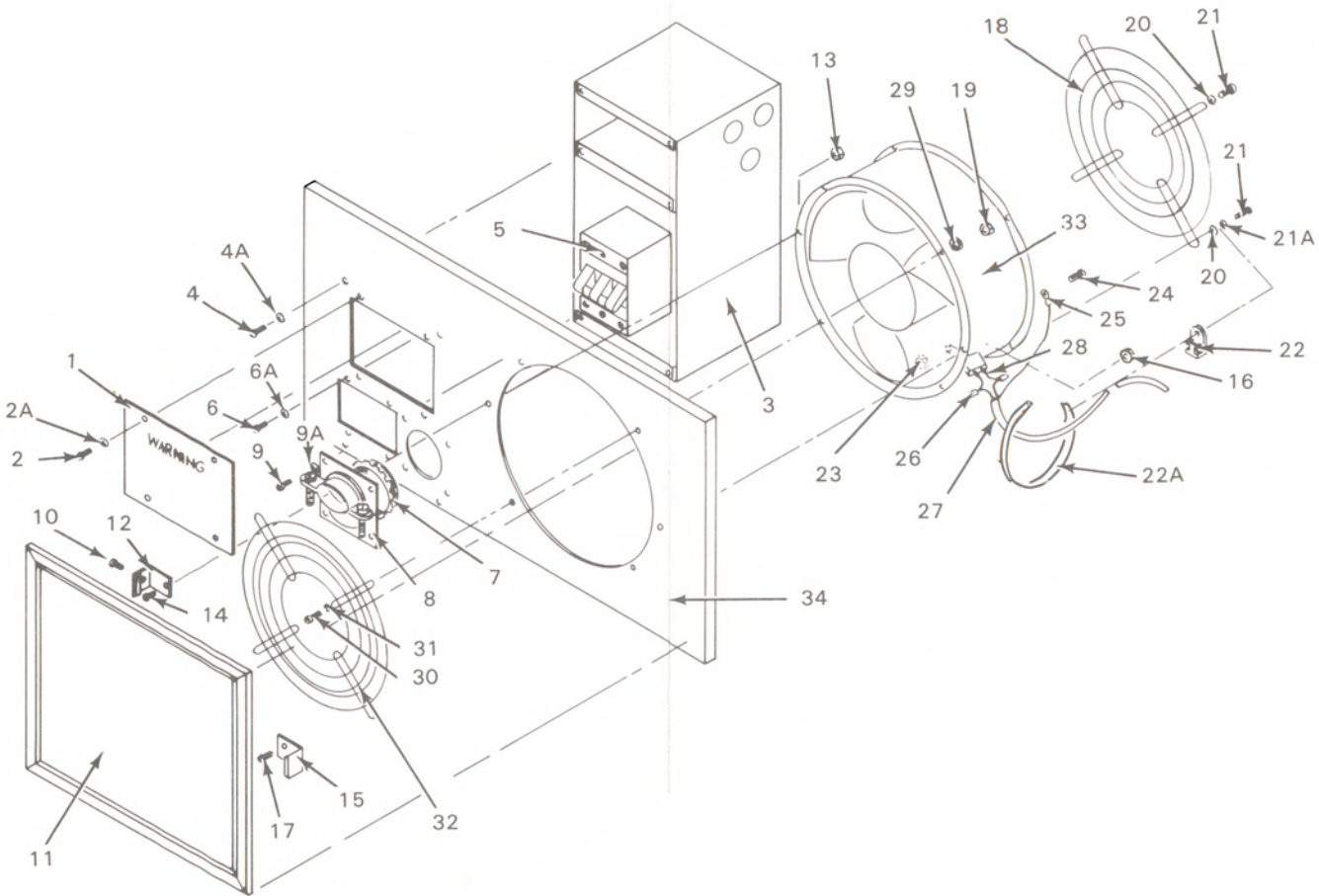


Figure 4-7. Exploded View Of Power Supply
4-15/4-16

Table 4-10. Replaceable Parts For Power Control Unit

Ref Des	hp Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	03047-04101	7	1	LINE FILTER COVER	28480	03047-04101
2	2360-0242	8	6	SCREW-MACH 6-32 1.25-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
3	02940-00266	7	2	PCU END CASE (Attaching Parts)	28480	02940-00266
4	2360-0115	4	9	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
5	02940-00267	8	1	PCU SIDE CASE (Attaching Parts)	28480	02940-00267
6	2360-0115	4	2	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
7	0100-0300	7	1	CONDUIT CONNECTOR STR; 3/4 IN IPS PIPE	59730	3303M
8	0100-0433	7	1	CONDUIT LOCKNUT FOR 1/2 IN DIA CONDUIT	00000	ANY SATISFACTORY SOURCE
9	0100-0459	7	#	CONDUIT NIPPLE 0.50 IN DIA CND; 1.0 IN	59730	1942
11	02940-00268	9	1	PCU SIDE CASE CONDUIT (Attaching Parts)	28480	02940-00268
12	2360-0115	4	2	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
13			1	TERMINAL BLOCK ASSEMBLY (TB2) (Attaching Parts)		
14	2580-0006	8	2	NUT-HEX-W/LKWR 8-32-THD .125-IN-THK	00000	ANY SATISFACTORY SOURCE
15	3050-0139	6	2	WASHER-FL MTLC NO. 8 .172-IN-ID	00000	ANY SATISFACTORY SOURCE
16	2510-0107	3	4	SCREW-MACH 8-32 .5-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
	03060-1094	8	1	END-BARRIER BLOCK-PHENOLIC; FLAT BASE	98410	ORDER BY DESCRIPTION
	03060-1570	5	8	SECTION-BARRIER BLOCK 1 TERM; TWIN SCREW	89020	212
17	02940-00270	3	1	PCU BASE (Attaching Parts)	28480	02940-00270
18	2360-0115	4	2	SCREW-MACH 6-32 .312-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
19	9100-3506	0	1	TRANSFORMER-POWER PRI: 120/208/240V (Attaching Parts)	40931	AT87A1056
20	2740-0002	4	4	NUT-HEX-DBL-CHAM 10-32-THD .125-IN-THK	00000	ANY SATISFACTORY SOURCE
21	2190-0074	3	4	WASHER-LK HLCL NO. 10 .194-IN-ID	00000	ANY SATISFACTORY SOURCE
22	3050-0226	2	4	WASHER-FL MTLC NO. 10 .203-IN-ID	00000	ANY SATISFACTORY SOURCE
23	0490-0844	9	1	RELAY 4A 24VAC-COIL 40A 230VAC (Attaching Parts)	04009	ACC440-8011A
24	2740-0002	4	4	NUT-HEX-DBL-CHAM 10-32-THD .125-IN-THK	00000	ANY SATISFACTORY SOURCE
25	2190-0074	3	4	WASHER-LK HLCL NO. 10 .194-IN-ID	00000	ANY SATISFACTORY SOURCE
26	3050-0226	2	4	WASHER-FL MTLC NO. 10 .203-IN-ID	00000	ANY SATISFACTORY SOURCE
27			1	TERMINAL BLOCK ASSEMBLY (TB1) (Attaching Parts)		
28	2580-0006	8	2	NUT-HEX-W/LKWR 8-32-THD .125-IN-THK	00000	ANY SATISFACTORY SOURCE
29	3050-0139	6	2	WASHER-FL MTLC NO. 8 .172-IN-ID	00000	ANY SATISFACTORY SOURCE
30	2510-0107	3	2	SCREW-MACH 8-32 .5-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
	0360-1094	8	1	END-BARRIER BLOCK-PHENOLIC; FLAT BASE	98410	ORDER BY DESCRIPTION
	0360-1570	5	4	SECTION-BARRIER BLOCK 1 TERM; TWIN SCREW	89020	212
31	2510-0099	2	4	SCREW-MACH 8-32 .25-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
32	2190-0009	4	4	WASHER-LK INTL T NO. 8 .168-IN-ID	00000	ANY SATISFACTORY SOURCE
33	02940-20122	6	1	GROUNDING BAR (Attaching Parts)	28480	02940-20122
34	2580-0006	8	2	NUT-HEX-W/LKWR 8-32-THD .125-IN-THK	00000	ANY SATISFACTORY SOURCE
35	2510-0123	3	1	SCREW-MACH 10-32 1.125-IN-LG 82 DEG	00000	ANY SATISFACTORY SOURCE
36	2510-0107	3	1	SCREW-MACH 8-32 .5-IN-LG PAN-HD-POZI	00000	ANY SATISFACTORY SOURCE
37	02940-00269	0	1	PCU DECK	28480	02940-00269
38	9135-0614	3	1	FILTER-LINE	28480	9135-0614
39	0515-0211	8	4	SCREW-MACH M3 X 0.5 6MM-LG PAN HD	00000	ANY SATISFACTORY SOURCE

#NOTE: Either one or two of these parts are used. If only one is used, the second is replaced by part no. 6960-0015.

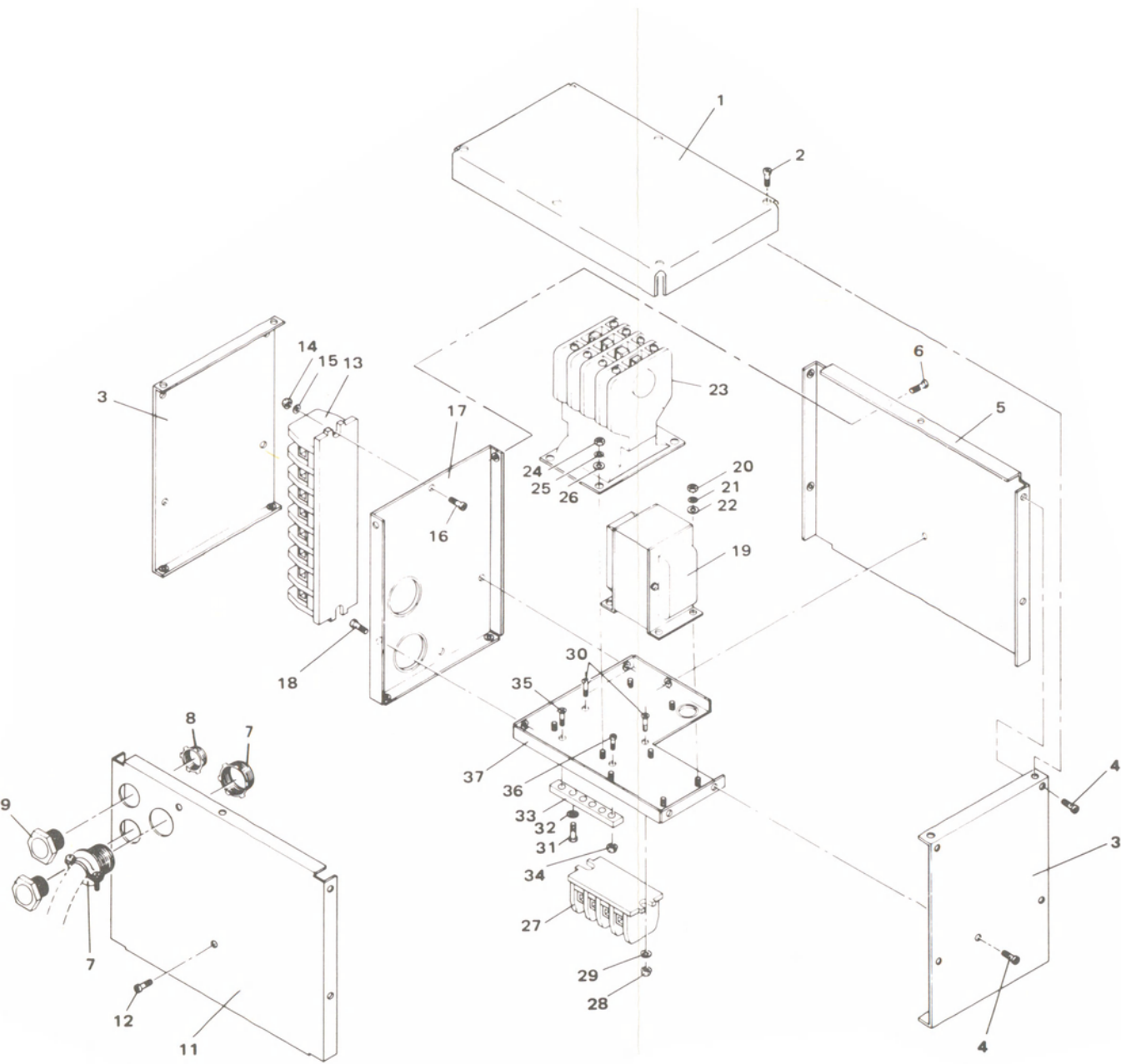
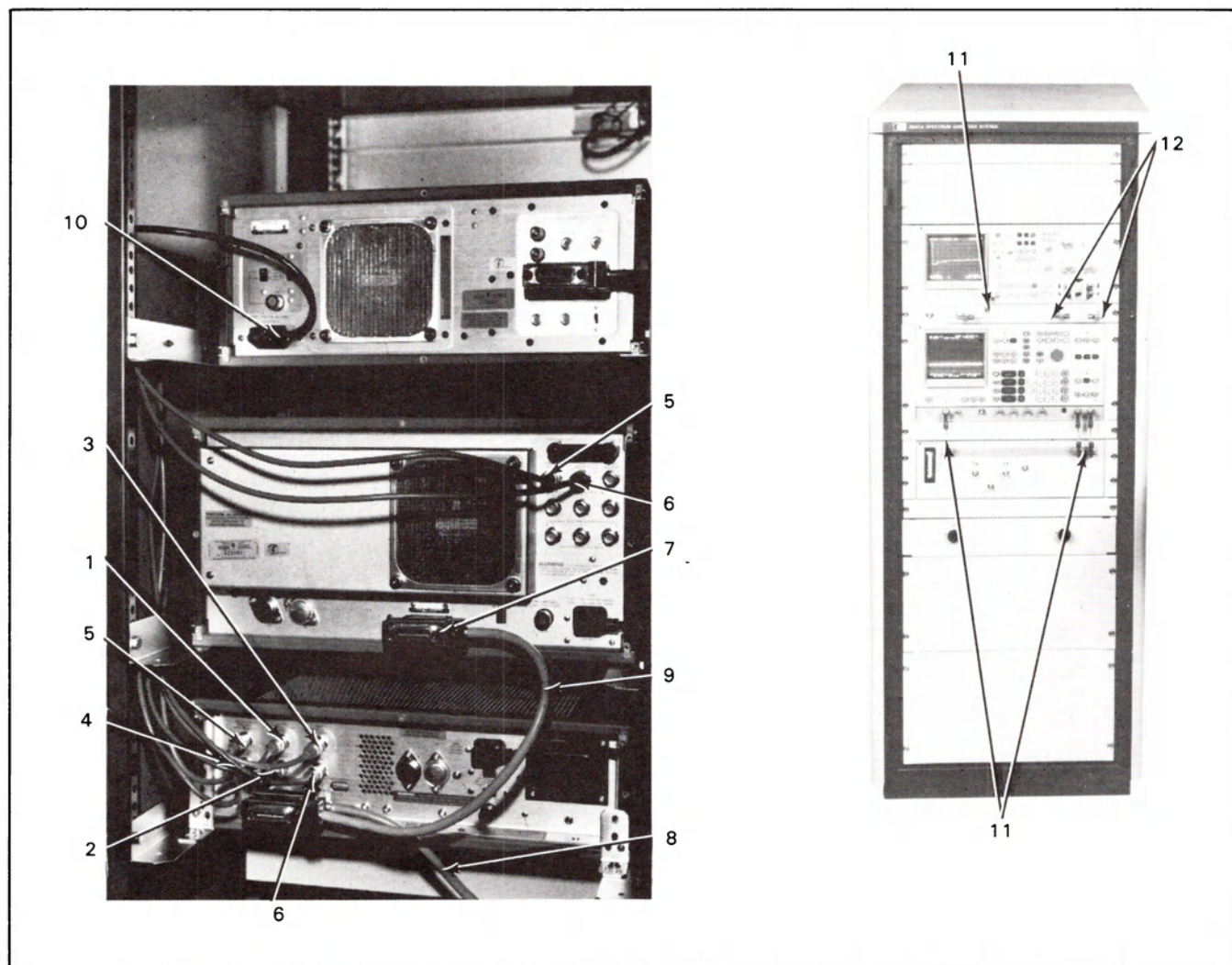


Figure 4-8. Exploded View Of Power Control Unit
4-17/4-18

Table 4-11. Replaceable Parts For The System Cabling

Ref Des	hp Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
1	03047-61603	4	1	CABLE ASSEMBLY, 3582B INPUT	28480	03047-61603
2	03047-61604	5	1	CABLE ASSEMBLY, 3582A INPUT	28480	03047-61604
3	03047-61605	6	1	CABLE ASSEMBLY, NOISE	28480	03047-61605
4	03047-61606	7	1	CABLE ASSEMBLY, 10MHZ REF OUT	28480	03047-61606
5	03047-61607	8	1	CABLE ASSEMBLY 3585 10 MHz REF	28480	03047-61607
6	03047-61608	9	1	CABLE ASSEMBLY, IF OUT	28480	03047-61608
7	9135-0159	6	1	FILTER-LINE	00779	841928-1
8	5060-9455	0	1	HP-IB CABLE 1M	28480	5060-9455
9	5060-9458	3	1	HP-IB CABLE 0.5M	28480	5060-9458
10	8120-2307	8	3	POWER CORD SET 18-AWG 3-COND 12-IN-LG	16428	ORDER BY DESCRIPTION
11	03047-61602	3	4	CABLE-COAX, FRONT PANEL	28480	03047-61602
12	03047-62101	9	2	CONN ASSEMBLY	28480	03047-62101

**Figure 4-11. System Cabling**

SALES & SUPPORT OFFICES

Arranged alphabetically by country



Product Line Sales/Support Key

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A Analytical
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C Computer Systems
CP Computer Systems Primary Service Responsible Office (SRO)
CS Computer Systems Secondary SRO
E Electronic Instruments & Measurement Systems
M Medical Products
MP Medical Products Primary SRO
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P Personal Computing Products
 * Sales only for specific product line
 ** Support only for specific product line

IMPORTANT: These symbols designate general product line capability. They do not insure sales or support availability for all products within a line, at all locations. Contact your local sales office for information regarding locations where HP support is available for specific products.

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 Tel: (02) 762-32-00
 Telex: 23-494 paloben bru
 A,CM,CP,E,MP,P

BRAZIL

Hewlett-Packard do Brasil I.e.C.
 Ltda.
 Alameda Rio Negro, 750
ALPHAVILLE 06400 Barueri SP
 Tel: 421-1311
 Telex: 011 23602 HPBR-BR
 Cable: HEWPARG Sao Paulo
 A,CM,CP,E,MS
 Hewlett-Packard do Brasil I.e.C.
 Ltda.
 Avenida Epitacio Pessoa, 4664
22471 RIO DE JANEIRO-RJ
 Tel: 286-0237
 Telex: 021-21905 HPBR-BR
 Cable: HEWPARG Rio de Janeiro
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BURUNDI

Typomeca S.P.R.L.
B.P. 553
BUJUMBURA
Tel: 2659
P

CANADA

Alberta
 Hewlett-Packard (Canada) Ltd.
 210, 7220 Fisher Street S.E.
CALGARY, Alberta T2H 2H8
 Tel: (403) 253-2713
 Telex: 610-821-6141
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Hewlett-Packard (Canada) Ltd.
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EDMONTON, Alberta T5M 3T9
 Tel: (403) 452-3670
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 Telex: 610-271-4482
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 Telex: 610-563-1636
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 Telex: 610-422-3022
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Jorge Calcagni y Cia. Ltda.
Arturo Burhle 065
Casilla 16475
SANTIAGO 9
Tel: 220222
Telex: JCALCAGNI
 A,CM,E,M
Olympia (Chile) Ltd.
Rodrico de Araya 1045
Casilla 256-V
SANTIAGO 21
Tel: 25-50-44
Telex: 40-565
C,P

COLOMBIA

Instrumentación
H. A. Langebaek & Kier S.A.
Apartado Aéreo 6287
BOGOTÁ 1, D.E.
Carrera 7 No. 48-75
BOGOTÁ, 2 D.E.
Tel: 287-8877
Telex: 44400
 Cable: AARIS Bogota
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COSTA RICA

Cientifica Costarricense S.A.
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SAN JOSE
Tel: 24-38-20, 24-08-19
Telex: 2367 GALGUR
 Cable: GALGUR
 CM,E,M

CYPRUS

Teletera Ltd.
P.O. Box 4809
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E,M,P

CZECHOSLOVAKIA

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 Hewlett-Packard A/S
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 Telex: 37409 hpas dk
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CYEDE Cia. Ltda.
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Telex: 2548 CYEDE ED
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M

EGYPT

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Sami Amin Trading Office
18 Abdel Aziz Gawish
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P
International Engineering Associates
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CAIRO
Tel: 23-829
Telex: 93830
E,M
Informatic For Computer Systems
22 Talaat Harb Street
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C

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Edificio Sarah 1148
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 A,C,CM,E,P

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F-25026 **BESANCON**
28 Rue de la Republique
F-25000 **BESANCON**
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Hewlett-Packard France
Bureau de Vente de Lyon
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F-69130 **ECULLY** Cédex
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A,C,M,CP,E,MP

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C,M,E

Hewlett-Packard France
5th Avenue Raymond Chanas
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C,M,CS

Hewlett-Packard France
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32 Rue Lothaire
F-57000 **METZ**
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C,M,CS

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F-91947 Les Ulis Cédex **ORSAY**
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F-35100 **RENNES**
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E,M,P

"Plaiso"
G. Gerados
24 Stournara Street
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P

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Schmidt & Co. (Hong Kong) Ltd.
Wing On Centre, 28th Floor
Connaught Road, C.

HONG KONG
Tel: 5-455644
Telex: 74766 SCHMX HX
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Eliding Trading Company Inc.
Hafnarvöll-Tryggvagotu
P.O. Box 895
IS-REYKJAVIK
Tel: 1-58-20, 1-63-03
M

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Blue Star Ltd.
Bhavdeep
Stadium Road
AHMEDABAD 380 014
Tel: 42932
Telex: 012-234
Cable: BLUEFROST
E

Blue Star Ltd.
11 Magarath Road
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Tel: 55668
Telex: 0845-430
Cable: BLUESTAR
A,C,M,C,E

Blue Star Ltd.
Band Box House
Prabhadevi
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Telex: 011-3751
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Blue Star Ltd.
Sahas
414/2 Vir Savarkar Marg
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7 Hare Street
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Blue Star Ltd.
Meenakshi Mandiram
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Telex: 085-514
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A*

Blue Star Ltd.
133 Kodambakkam High Road
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Cable: BLUESTAR
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Blue Star Ltd.
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Maruthankuzhi
TRIVANDRUM 695 013
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Telex: 0884-259
Cable: BLUESTAR
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Telex: 31146 BERSAL IA
Cable: BERSAL JAKARTA
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BERCA Indonesia P.T.
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CP

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Telex: 30439
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Cardiac Services Ltd.
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Artane
DUBLIN 5, Eire
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M

SALES & SUPPORT OFFICES

Arranged alphabetically by country

3



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TEL-AVIV 67899
 Tel: 338973
 Telex: 33569 Motil IL
 Cable: BASTEL Tel-Aviv
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 Giulio Petrone, 19
 I-70124 BARI
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M
 Hewlett-Packard Italiana S.p.A.
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 I-40132 BOLOGNA
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 Hewlett-Packard Italiana S.p.A.
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 I-95126 CATANIA
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 Telex: 970291
 C,P
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 I-20063 CERNUSCO SUL NAVIGLIO
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 Hewlett-Packard Italiana S.p.A.
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 I-16156 GENOVA PEGLI
 Tel: (010) 68-37-07 E,C
 Hewlett-Packard Italiana S.p.A.
 Via Turazza 14
 I-35100 PADOVA
 Tel: (49) 664888
 Telex: 430315
 A,CM,CS,E,MS
 Hewlett-Packard Italiana S.p.A.
 Viale C. Pavese 340
 I-00144 ROMA
 Tel: (06) 54831
 Telex: 610514
 A,CM,CS,E,MS,P*
 Hewlett-Packard Italiana S.p.A.
 Corso Giovanni Lanza 94
 I-10133 TORINO
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 Telex: 221079
 CM,CS,E
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 ATSUGI, Kanagawa 243
 Tel: (0462) 24-0451
 CM,C*,E
 Yokogawa-Hewlett-Packard Ltd.
 3-30-18 Tsurya-cho
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 KANAGAWA, 221
 Tel: (045) 312-1252
 Telex: 382-3204 YHP YOK
 CM,CS,E

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 69 Kyo-Machi Ikuta-Ku
 KOBE CITY 650 Japan
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 C,E
 Yokogawa-Hewlett-Packard Ltd.
 Kumagaya Asahi Yasoji Bldg 4F
 4-3 Chome Tsukuba
 KUMAGAYA, Saitama 360
 Tel: (0485) 24-6563
 CM,CS,E
 Yokogawa-Hewlett-Packard Ltd.
 Mito Mitsui Building
 4-73, San-no-maru, 1-chome
 MITO, Ibaragi 310
 Tel: (0292) 25-7470
 CM,CS,E
 Yokogawa-Hewlett-Packard Ltd.
 Sumitomo Seimei Bldg.
 11-2 Shimo-sasajima-cho
 Nakamura-ku
 NAGOYA, Aichi 450
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 CM,CS,E,MS
 Yokogawa-Hewlett-Packard Ltd.
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 A,CM,CP,E,MP,P*
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JORDAN
 Mouasher Cousins Company
 P.O. Box 1387
AMMAN
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 E,M,P
KOREA
 Samsung Electronics
 4759 Shinkil, 6 Dong
 Youngdeungpo-Ku,
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 Tel: 8334311, 8334312
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 A,C,E,M,P
KUWAIT
 Al-Khalidya Trading & Contracting
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 A,E,M
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KUWAIT
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 P
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 Woluwedal
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 A,E,M
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 A,CP,E,MS,P
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 144 Agege Motor Road, Mushin
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 Telex: 747626
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 Telex: 16621 hpnas n
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 Tel: 72-22-17, 72-22-25
 Telex: 3289 BROKER MB MUSCAT
 P

PAKISTAN

Mushko & Company Ltd.
 10, Bazar Road
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 Tel: 28624
 Cable: FEMUS Rawalpindi
 A,E,M
 Mushko & Company Ltd.
 Oosman Chambers
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 P.O. Box 2649 Manila
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 Telex: 742-40287
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M

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M
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Cable: ELECTA AL-KHOBAR
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Modern Electronic Establishment
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CM,CS
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